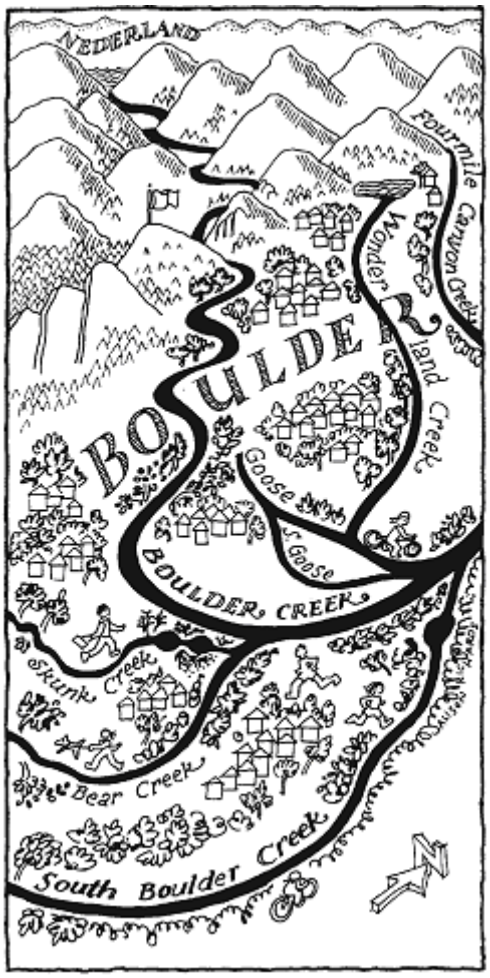
# Greenways Master Plan




2011

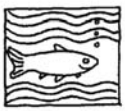
**City of Boulder**

# Greenways
## Purpose Statement

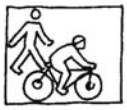
The purpose of the Greenways Program is to extend the stewardship of the city of Boulder to the important riparian areas along the tributaries of Boulder Creek.

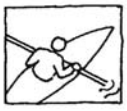
The Greenways Program will manage these areas so as to integrate the following objectives:

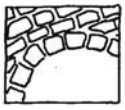

to protect and restore riparian, floodplain, & wetland habitat


to enhance water quality


to facilitate storm drainage & mitigate floods


to provide alternative transportation routes or trails for pedestrians & bicyclists


to provide recreation opportunities


to protect cultural resources

# Greenways Master Plan

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# Executive Summary

## Introduction

The City of Boulder Greenways system is comprised of a series of corridors along riparian areas including Boulder Creek and 14 of its tributaries, which provide an opportunity to integrate multiple objectives, including habitat protection, water quality enhancement, storm drainage and floodplain management, trails, recreation and cultural resources. The purpose of the Greenways Program is to extend the stewardship of the City of Boulder to the important riparian areas along the tributaries of Boulder Creek. The Greenways Master Plan provides a framework to implement the program through coordinating planning, construction, maintenance activities and funding sources of multiple city departments and outside agencies.

The purpose of the Greenways Program is to extend the stewardship of the City of Boulder to the important riparian areas along the tributaries of Boulder Creek

The Greenways Master Plan provides a framework to implement the program through coordinating planning, construction, maintenance activities and funding sources of multiple city departments and outside agencies.

The original Greenways Master Plan was adopted by City Council in 1989. The master plan has been updated a number of times, and this latest update includes two key components; (1) the expansion of the Greenways Program to include all of the fourteen major tributaries to Boulder Creek within the city of Boulder; and (2) a summary of current changes to policies and plans that affect implementation of the Greenways Program. The update also provides descriptions of current conditions based on changes that have occurred within the system since the last plan update in 2001. The purpose and objectives of the Greenways Program have not changed.

## Background

In 1984, the City adopted the Boulder Creek Corridor Plan, which recommended development of a continuous path along the entire length of Boulder Creek to serve both as a flood hazard mitigation measure and a linear urban park for recreational and transportation use, as well as provide restoration and enhancement of wetlands and fish and wildlife habitat. When completed in 1987, the Boulder Creek corridor provided not only recreational and transportation opportunities, but a buffer zone between the stream channel and nearby development as well.

The Greenways Program is an outgrowth of the Boulder Creek Corridor Project. It was created on the basis of recognition that stream corridors are a vital link in the larger environmental system and that each stream is a natural and cultural resource. Funding for a Greenways Plan was approved by City Council in December, 1987. A Master Plan was developed for the Greenways Program and adopted by City Council in January, 1989. The 1989 plan included Boulder Creek and six tributaries. A refined Tributary Greenways Master Plan was approved by Council in September, 1990. The intent of the original Master Plan was to articulate the overall policy direction for the Program. In August, 1993, City Council directed the Greenways Coordinator to convene an interdepartmental team to update the Master Plan. A public meeting was held in September, 1998 to develop an approach for public involvement in the Master Plan update process. A core group of staff, representing multiple city divisions and departments developed the 2001 Greenways Master Plan update.

The purpose of the 2011 update to the Greenways Master Plan is to add the remaining tributaries to the plan consistent with direction from the Comprehensive Flood and Stormwater Master Plan; bring the plan up to date on progress that has been made to the Greenways program since 2001; and to reflect current adopted policies and plans. Purpose and objectives of the program have not changed. Chapter 1 of the 2011 master plan provides a more comprehensive history of the Greenways Program including a summary of existing conditions.

**Key Policies and Issues**
The Greenways Master Plan builds on policies outlined in several existing adopted plans including the Boulder Valley Comprehensive Plan, the Comprehensive Flood and Stormwater Utility Master Plan, the Transportation Master Plan, Parks and Recreation Master Plan, the Water Quality Strategic Plan, subcommunity plans, and stream specific flood mitigation plans. In addition, Boulder Revised Code requires securing a floodplain development permit and wetlands permit for most Greenways improvement projects. Chapter 2 of the 2011 master plan update provides a complete summary of the key policies and issues that affect implementation of the Greenways Program.

**Implementation**
Greenways Program objectives developed by the interdisciplinary staff work group are based upon the goals, objectives and policies from related master planning efforts, current federal, state and local regulations, standards and criteria, and public comment obtained through a series of public meetings convened in the course of the 2001 Master Plan update. The objectives include:

- Protect and restore riparian, floodplain and wetland habitat
- Enhance water quality
- Mitigate storm drainage and floods
- Provide alternative modes of transportation routes or trails for pedestrians and bicyclists
- Provide recreation opportunities
- Protect cultural resources

The Greenways Master Plan divides each tributary into reaches to facilitate a manageable implementation approach for improvements. An inventory of each reach was completed to identify existing conditions and future opportunities for project-based improvements. Chapter 3 of the 2011 master plan identifies project opportunities, program expansion opportunities and the required approach for project implementation. The opportunities defined in the plan are based on the program goals and objectives along with direction provided from formally adopted plans. The approach required to implement a Greenways project has been updated to reflect current city requirements.

**Program Operation and Funding**
The Greenways system is maintained by several entities and construction and maintenance activities are funded by the City's Transportation Fund, Stormwater and Flood Control Utility Fund and the State's Lottery Fund. Each of these funding sources provides $150,000 annually to

the program for a total of $450,000 per year. Additional funding is provided by Urban Drainage and Flood Control District.

The Greenways Program is administered by the Greenways Coordinator in the Public Works Department, who works in conjunction with the Planning, Open Space and Mountain Parks, and Parks and Recreation Departments and other work groups within Public Works (Water Quality, Utilities Flood Control, and Transportation). Chapter 4 of the 2011 master plan update provides a summary of the Greenways maintenance program along with how the program is managed and funded. A map in the pocket of this plan shows routine maintenance responsibilities by entity and trail segment.

# 1 Background

## *1.1 Introduction*

The City of Boulder Greenways system is comprised of a series of corridors along riparian areas including Boulder Creek and 14 of its tributaries, which provide an opportunity to integrate multiple objectives, including habitat protection, water quality enhancement, storm drainage and floodplain management, trails, recreation and cultural resources. The purpose of the Greenways Program is to extend the stewardship of the City of Boulder to the important riparian areas along the tributaries of Boulder Creek. The Greenways Master Plan provides a framework to implement the program through coordinating planning, construction, maintenance activities and funding sources of multiple city departments and outside agencies.

The original Greenways Master Plan was adopted by City Council in 1989. The master plan has been updated a number of times, and this latest update includes two key components; (1) the expansion of the Greenways Program to include all of the fourteen major tributaries to Boulder Creek within the city of Boulder ; and (2) a summary of current changes to policies and plans that affect implementation of the Greenways Program. The update also provides descriptions of current conditions based on changes that have occurred within the system since the last plan update in 2001

This chapter provides a summary of what the Greenways Program is, provides a history of the Program, presents a chronology of completed Greenways projects and concludes with a description of existing conditions along the Greenways system.

The City of Boulder Greenways system is comprised of Boulder Creek and the following tributaries:

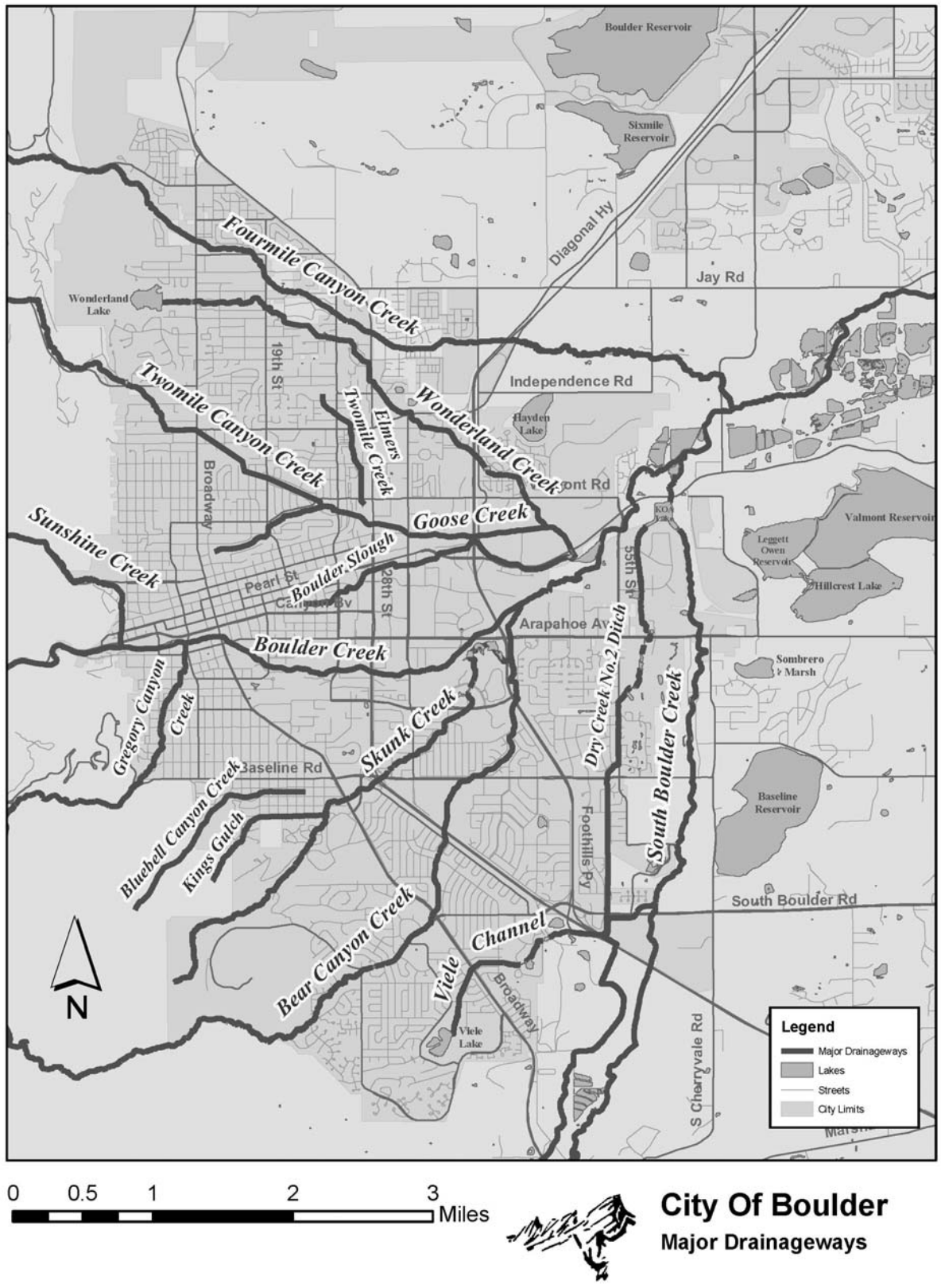
1. Bear Canyon Creek
2. Bluebell Canyon Creek
3. Dry Creek No. 2
4. Elmer's Two Mile Creek
5. Fourmile Canyon Creek
6. Goose Creek
7. Gregory Canyon Creek
8. Kings Gulch
9. Skunk Creek
10. South Boulder Creek
11. Sunshine Creek
12. Two Mile Canyon Creek
13. Viele Canal
14. Wonderland Creek

Drainage basin size and stream length for each of these creeks is shown in **Table 1-1**. **Figure 1-1** shows the 14 main tributaries.

**Table 1-1: Drainage Basin Size and Length for Tributaries**

| | Creek/Drainage Name | Stream Length (miles) | Tributary Area ($mi^2$) |
|---|---|---|---|
| | Boulder Creek | 7.6 | 115* |
| 1 | South Boulder Creek | 3.7 | 124.7 |
| 2 | Dry Creek No. 2 | 4.1 | 29.5 |
| 3 | Fourmile Canyon Creek | 5.9 | 9.7 |
| 4 | Bear Canyon Creek | 6.3 | 5.3 |
| 5 | Goose Creek | 3.0 | 2.7 |
| 6 | Wonderland Creek | 4.3 | 2.1 |
| 7 | Two Mile Canyon Creek | 2.9 | 2.0 |
| 8 | Sunshine Canyon Creek | 2.9 | 1.9 |
| 9 | Gregory Canyon Creek | 1.8 | 1.9 |
| 10 | Skunk Creek | 4.5 | 1.8 |
| 11 | Viele Channel | 2.0 | 1.2 |
| 12 | Bluebell Canyon Creek | 1.9 | 0.7 |
| 13 | Elmer's Two Mile Creek | 1.0 | 0.7 |
| 14 | Kings Gulch | 1.2 | 0.4 |
| | Totals | 53.1 | 299.6 |

**Figure 1-1: Major Tributuaries**



## 1.2 History

In 1910, Frederick Law Olmsted, Jr. warned the Boulder Civic Improvement Association of the dangers of encroaching upon the floodplain of Boulder Creek (Olmsted 1910). His report described the possible scenario of filling the land near the creek with private uses,

> "...thus restricting the flood channel of the stream and sooner or later causing calamitous floods. This is on its face a plain, straightforward question of hydraulics and municipal common sense. If the people of Boulder only have the sense to take warning by the experience of other towns they will deal with it now, while it can be dealt with cheaply and easily, instead of waiting 'til a catastrophe forces them to remedy their neglect under conditions that will make a solution far more costly and less satisfactory."

Olmsted recommended against the construction of a deep, artificial flood channel. Instead he suggested that Boulder Creek be allowed to remain in a small, shallow channel for the ordinary stages of the stream, with occupation of a much broader floodplain during larger storms. Recognizing the need to dedicate the land to a useful purpose, he suggested the plan of "keeping open for public use near the heart of the city a simple piece of pretty bottom-land of the very sort that Boulder Creek has been flooding over for countless centuries" as the cheapest way of handling the flood problem of Boulder Creek (Olmsted, 1910).

In 1969, the City of Boulder was impacted by a moderate flood which caused $5 million in damages. The following decade marked the City's first serious effort in flood control. Initial investigations focused on the then-traditional flood mitigation techniques, such as hard-lining stream channels and using concrete structural facilities to channel stream flow. However, these plans later contradicted the City's commitment to improve the quality of life and the urban environment and evoked considerable public opposition.

With the goal of maintaining and enhancing the aesthetic and environmental integrity of Boulder Creek and its tributaries, the city decided to pursue alternative solutions to flood control. In 1978, the City adopted a "non-containment" policy for Boulder Creek as part of the Boulder Valley Comprehensive Plan. This policy promoted ongoing city efforts to protect public safety by restricting development within the floodplain associated with Boulder Creek and its tributaries.

**Boulder Creek Corridor Plan**

In 1984, the City adopted the Boulder Creek Corridor Plan, which recommended development of a continuous path along the entire length of Boulder Creek to serve both as a flood hazard mitigation measure and a linear urban park for recreational and transportation use, as well as provide restoration and enhancement of wetlands and fish and wildlife habitat. Design guidelines were established to set standards for appearance, quality and placement of elements which were incorporated in the Boulder Creek corridor. The design guidelines were drafted by the Parks and Recreation Department, with input from many other city departments. The design guidelines were reviewed and approved by the Parks and Recreation Advisory Board, Planning

Board, Open Space Board of Trustees, City Council, the University of Colorado, and the Boulder Valley School District.

When completed in 1987, the Boulder Creek corridor provided not only recreational and transportation opportunities, but a buffer zone between the stream channel and nearby development as well. The buffer zone is designed to retain storm water which might otherwise cause considerably more damage in the event of a severe flood. Wetlands were created and enhanced along the corridor to provide water quality protection through the natural retention and filtering of storm water. Lands were purchased by the city to provide additional storm water retention or to remove structures from the high hazard zone[1].

The Boulder Creek project also preserved and/or enhanced the riparian environment along the creek, which had been considerably damaged. Natural vegetation was planted and corridor use was redirected to the Boulder Creek path to reduce on-going damage. Aquatic habitat, which had been severely affected by diminished stream flows and efforts to channel the creek, was enhanced, and a self-sustaining creek channel and healthy aquatic habitat were established with the implementation of minimum stream flow agreements for Boulder Creek.

**Establishing the Greenways Program**

The Greenways Program was an outgrowth of the Boulder Creek Corridor Project. It was created on the basis of recognition that stream corridors are a vital link in the larger environmental system and that each stream is a natural and cultural resource. The public acclaim of the Boulder Creek Project led to increased public discussion about the desirability of extending and continuing the concept of the Boulder Creek Project along Boulder Creek's tributaries within the city.

Funding for a Greenways Plan was approved by City Council in December, 1987. A Master Plan was developed for the Greenways Program by staff from the Planning, Public Works, Parks and Recreation and Real Estate and Open Space and Mountain Parks Departments. The first Tributary Greenways Master Plan was adopted by City Council in January, 1989 and included the original six designated tributaries to Boulder Creek. A refined Tributary Greenways Master Plan, design guidelines, a capital improvement program and a more detailed reproducible map were approved by Council in September, 1990. The intent of the original Master Plan was to articulate the overall policy direction for the Program. The map indicated a conceptual layout of the proposed trails and the design guidelines addressed environmental preservation and restoration, trail location and design, as well as privacy, safety and inter-modal conflicts.

The Tributary Greenways Master Plan described the purpose of the Program as, "providing a unique opportunity for creating a comprehensive Greenways system for the community that can be creatively developed to function as storm drainage and flood channels, efficient bicycle and pedestrian transportation systems, open space and wildlife corridors and attractive recreation

[1] "High hazard zone" means those portions of the floodplain where an unacceptably high hazard to human safety exists because the product number of flow velocity (measured in feet/second) times flow depth (measured in feet) equals or exceeds four, or because flow depths equal or exceed four feet (Boulder Revised Code 9-2-2(a)).

areas." It was immediately recognized that these purposes may conflict at times. With this in mind, staff has followed a design process predicated on public participation and conflict resolution. Each major project is publicly reviewed during the design process. This process includes participation by concerned neighborhoods, city boards, city staff, and other affected interests. It is built around the need to have neighborhood values, environmental values, and project needs integrated in the design of all projects.

**Public Review of Greenways Projects**

Greenways projects are evaluated through the Community and Environmental Assessment Process (CEAP) (Appendix I) which, in the past, was undertaken by one or more city advisory boards. All Greenways project CEAPs are now reviewed by the Greenways Advisory Committee. Committee recommendations are subject to City Council review and approval. Additional opportunities for public comment and review are available through the various permitting processes associated with individual projects, and through the development of the annual city budget.

In August, 1993, City Council directed the Greenways Coordinator to convene an interdepartmental team to update the Master Plan, with the major focus on the revision of the map. The Master Plan goals and criteria did not change substantially from the original Master Plan. In addition, the update was to provide an evaluation of the successes of the Program to date, based on how well the goals and criteria of the Master Plan had been achieved, with identification of any mid-course corrections. This Master Plan update was to coincide with the Transportation Master Plan update, which was delayed for a number of years. The information requested was presented to Council on May 5, 1998.

**Plan Updates**

The May 5, 1998 submittal to Council included an updated Greenways Master Plan map which depicted factual changes, including completed projects, as well as a Greenways Master Plan update survey which was completed by the National Research Center. The Master Plan map was reviewed with recommendations for approval from the five boards that oversee the Greenways Program (Water Resources Advisory Board, Transportation Advisory Board, Parks and Recreation Advisory Board, Open Space Board of Trustees and the Planning Board).

On May 5, 1998, City Council approved the Greenways Map and directed staff to update the Greenways Master Plan. The Greenways Coordinator position was vacated soon after this direction was given, providing City staff an opportunity to reevaluate which work group would assume the responsibility of the Program and carry forth course direction. It was decided that the Public Works Utilities Division would assume the responsibilities of the Greenways Program (formerly in the Public Works Transportation Division).

A public meeting was held in September, 1998 to develop an approach for public involvement in the Master Plan update process. It was the group consensus that the process would involve numerous opportunities for public comment on a City staff written plan. A core group of staff, representing multiple city divisions and departments was assembled to evaluate issues and

participate in the development of the Greenways Master Plan update. The Greenways Master Plan was updated in 2001 following this process.

The purpose of this current ( 2011) update to the Greenways Master Plan is to add the remaining seven tributaries to the plan consistent with direction from the Comprehensive Flood and Stormwater Master Plan; to bring the plan up to date on progress that has been made to the Greenways program since 2001; and to reflect current adopted policies and plans. Purpose and objectives of the program have not changed and therefore the public process has been limited to public hearings.

## *1.3 Chronology of Projects*

The following provides a summary of completed projects within creek corridors. A list of all of the tributaries along with their basin size and length through the city is presented in **Table 1-1**. **Figure 1-1** presents a map of the tributaries. **Tables 1-2** and **1-3** present a summary of the existing Greenways improvements.

**Boulder Creek Corridor**

The Boulder Creek Corridor Plan was adopted by the City in 1984. The completion of the Boulder Creek path in 1987 marked the successful integration of multiple objectives. Since 1987, the Greenways Program has continued to develop and enhance the Boulder Creek corridor, with the completion of the following projects:

- 1993 – Relocation of the trail through Boulder High School to the north bank of the creek as part of a major flood control project.
- 1996 - Restoration and replacement of creek side vegetation at Eben G. Fine Park in conjunction with the UDFCD.
- 1996 – Construction of a new rest area along the multi-use path at 13th and Arapahoe.
- 1997 – Construction of a new rest area at the confluence with Skunk Creek in the CU Research Park.
- 1999 – Stream bank restoration near the multi-use path at 55th Street as part of the UDFCD maintenance funding.
- 2001 - Utilities Division purchased a 20-unit High Hazard Zone apartment complex located at 299 Arapahoe Avenue. The apartment complex was demolished in 2002 and the land dedicated to Greenways.
- 2003 - Utilities Division purchased and razed a business duplex located at 2650 13th Street and a single family, detached residence at 1230 17th street. Both structures were located in the Boulder Creek High Hazard Zone.
- 2003 – Broadway Bridge replacement and wetlands pocket created.
- 2003 – Drop Structure repair, Fish Observatory window replacement and sediment removal in conjunction with UDFCD.
- 2004 - Utilities Division and Greenways Program purchased and razed a single family detached residence at 1228 17th Street (Mary Wolff property) with financial assistance from UDFCD. The structure was located in the Boulder Creek High Hazard Zone.
- 2005 - Improved connections at 28th Street.
- 2005/2006 - Cottonwood Ponds located south of Pearl Parkway west of 55th Street northeast side planting.

- 2005/2006 - Scott Carpenter Park located just south of Arapahoe between 29th Street and 30th Street north bank plantings
- 2006 - Construction of a path, habitat and passive recreational improvements at the Mary Wolff property located at 1228 17th Street (land purchased and structure demolished in 2004) was completed in the spring of 2006.
- 2008 - A flood mapping study was started for Boulder Creek in 2008. Anticipated completion is 2011.

**Fourmile Canyon Creek**

- 1989 - Trail construction and wetlands preservation work was performed in the section of Fourmile Canyon Creek between 28th and 30th Streets by the Greenways Program.
- 1994-1995 – The trail was continued east from 30th to 47th Streets as a part of the Palo Park subdivision development, using developer funds in conjunction with the Parks Department development of the Pleasant View Soccer Complex.
- 1995 - An underpass was constructed under Broadway along Fourmile Canyon Creek. This was funded through the Transportation Division budget utilizing Transportation Excise Tax funds. Contributions were also made from the Greenways budget.
- 1997 – The City purchased 2455 Sumac and constructed a trail connection from Tamarack to Riverside.
- 1998 - Trail construction and channel improvements were completed from Yellow Pine Avenue to Broadway. This work was funded through the Greenways budget and the Urban Drainage District Maintenance Funds.
- 1999- Wetland Planting and low water crossing constructed near Pleasantview Soccer fields.
- 2000 - Pre-flood acquisition of a High Hazard Zone property located at 1800 Violet Avenue.
- 2001 - The 1800 Violet Avenue pre-flood acquisition property was demolished and a High Hazard Zone home located at 2446 Sumac Avenue was purchased. The 2446 Sumac Avenue property was annexed to the City and zoned Rural Residential. The property was connected to the City's water and wastewater system. As of 2010, it is being rented until a decision regarding the Fourmile Canyon Creek flood mitigation work is made.
- 2003 – Constructed path connection from Fourmile to Wonderland Creek in conjunction with the Sunrise Assisted Living development.
- 2004 - Pre-flood property acquisition of two properties within the Fourmile Canyon Creek High Hazard Flood zone including: land of approximately ½ acre and outbuildings located at 2435 Topaz and 4018 North 26th Street.
- 2005 - Pre-flood property acquisition of the Goodhue property located within the Fourmile Canyon Creek High Hazard Flood zone at 2490 Topaz Street.
- 2006 – Purchased 2400 Topaz.
- 2006 - The Goodhue pre-flood acquisition property (2490 Topaz Street) was razed.
- 2007 - The City, with the Urban Drainage District, prepared a flood mitigation master plan for Fourmile Canyon Creek and Wonderland Creek. The plan recommendations were modified during the public process and accepted by City Council in 2009.
- 2009 - The City, with the UDFCD, completed a channel restoration project downstream of 30th street on Fourmile Canyon Creek. An area of previous excavation was repaired, low flow channel created and scour holes were filled in below two drop structures.
- 2009-2010 2020 Upland Annexation.

- 2010- Path Connection and underpass from Pleasantview Soccer fields to the Diagonal constructed by Boulder County. Greenways funded the easement acquisition.

**Wonderland Creek**

- 1989 - Construction of a trail between 26th Street and 28th Street was completed in cooperation with the Urban Drainage District.
- 1992 - Box culverts were installed under Wonderland Creek's Broadway and Valmont crossings with Transportation contributions to the Greenways Program.
- 1993 - Trail construction and channel improvements from 28th Street to Kalmia were begun with developer funds and continued in 1994 using Greenways Program funds.
- 1994 - Trail construction, channel improvements, riparian forest preservation, and wetland creation were completed in the Wonderland Creek corridor from Kalmia to the Diagonal as a joint city/private developer project.
- 1994-1995 - Drainage Improvements and Path Connection from Foothills to Valmont as part of the King's Ridge/Noble Park subdivisions.
- 2000 - Construction of path connection from 17th Street to Wonderland.
- 2001-2002 - Construction of drop structures upstream of Valmont as part of a new development.
- 2001 - Construction of path connection from Emerald to Poplar.
- 2001 - A Greenways improvement project along Wonderland Creek between Valmont Road and Goose Creek included channel and path construction between Valmont Road and North Goose Creek. The project was coordinated with the Parks and Recreation Department and the Urban Drainage and Flood Control District and was partially funded through the Greenways Program.
- 2003 - Construction of path connection from Wonderland to Fourmile by Greenways in coordination with the Sunrise Assisted Living development.
- North of Valmont Road and east of King's Ridge Boulevard – habitat restoration planting 2004 - 2006
- 2006 - Wonderland Creek underpass at 30th Street and the Diagonal with a path connection to Iris Avenue.
- 2006 - The University Center for Atmospheric Research (UCAR) constructed a path connection between Foothills Parkway and Center Green Drive to connect two of their facilities.
- 2007 - The City, with the Urban Drainage District, prepared a flood mitigation master plan for Fourmile Canyon Creek and Wonderland Creek in 2007. The plan recommendations were modified during the public process and accepted by City Council in 2009.
- 2009 - A CEAP for flood mitigation and multi-use trail extension along Wonderland Creek between Foothills Parkway and 30th Street began in 2009. Preliminary and final designs are anticipated for 2011 and 2012 with construction following.

**Goose Creek**

- 1987 – Drainage improvements were constructed from Foothills to Boulder Creek (Phase I).
- 1995 - The Urban Drainage and Flood Control District completed flood mitigation improvements between 30th Street and Foothills Parkway (Phase II).
- 1995 - Trail connections between Pearl Street and 30th Street were constructed and the trail from Foothills Parkway to Pearl Parkway.
- 2002 – Flood Utilities completed improvements along Goose Creek between 30th Street and 28th Street (Phase III). The project included drainage way improvements on the east and west sides of 28th Street as well as the construction of a large concrete culvert under 28th Street.
- 2002 – Construction of a path connection from Foothills Parkway to Valmont City Park at the confluence of Goose Creek and Wonderland Creek.
- 2003 – Construction of a path connection and storm drainage improvements between Goose Creek and 29th and Bluff.
- 2004 - Flood Utilities completed improvements along Goose Creek between 28th Street and Folsom Street (Phase IV). Project included channel improvements to convey 100-year event flows, extension of the multi-use path to the west side of Folsom Street, and separation of the creek from the Boulder and White Rock Ditch.
- 2004 – Goose Creek underpass at Foothills.

**Elmer's Two Mile Creek**

- 2002 - A Greenways improvement project along Elmer's Two Mile Creek between Iris Avenue and Glenwood Drive was completed. This project was done in conjunction with the Parks and Recreation Department and the Urban Drainage and Flood Control District (UDFCD). The project included replacement of a concrete low-flow channel with native vegetation and an extension of a multi-use path through a park site located between Iris Avenue and Glenwood Drive.
- 2007 - An underpass was constructed at Iris Avenue in conjunction with the Transportation Division and federal funding. The project included the underpass under Iris Avenue along with a path connection to Juniper Avenue.
- 2010 - Construction of Elmer's Two Mile Greenways project between Goose Creek and Glenwood Drive was completed. The project provides 100-year flood conveyance, water quality enhancement, and extension of the multi-use trail system along Elmer's Two Mile between the confluence with Goose Creek and Glenwood Drive. The project includes a grade-separated, multi-use path connection from Goose Creek to Glenwood Drive with an underpass at Valmont Road.

**Skunk Creek**

- 1989 - In conjunction with the development of the CU Research Park, the University of Colorado completed stream channel reconstruction, flood control improvements, wetland and pond creation, water quality improvements and trail construction along Skunk Creek from Boulder Creek to Colorado Avenue.
- 1992 - The Greenways Program completed a trail segment from the crossing under Colorado Avenue to the Wellman Canal near Aurora 7 School. This project also included wetlands creation.

- 1996 - The City installed underpasses beneath Baseline Road, U.S. 36 and the U.S. 36 on-ramp at Baseline as a component of the U.S. 36 bridge replacement project.
- 1997 - A rest area was constructed south of Arapahoe Avenue near the confluence with Boulder Creek.
- 2000 - An underpass at Broadway.
- 2003 - A multi-use path connection between the Skunk Creek underpass at Broadway and the existing path at US 36 was constructed. The project also included enhancement of the creek corridor and a water quality enhancement Best Management Practice behind the Basemar Shopping Center.
- 2007 – Construction of an underpass at 27th Way.
- 2008 – The City began a Letter of Map Revision (LOMR) for Skunk Creek from U.S. 36 to upstream of Broadway to reflect underpasses at Broadway and 27th Way. It is anticipated that this work will be completed in 2011.

**Bear Canyon Creek**

- 1991- An underpass at Baseline Road with trail connections to the CU main campus was constructed.
- 1992 - Trail reconstruction was completed between the Wellman Canal and Mohawk Drive.
- 1993 - The trail was extended between Mohawk and Gilpin Drives. This project also included riparian habitat widening and restoration, wetland creation, landscaping, the construction of an underpass at Arapahoe Avenue, and a low water crossing downstream of Mohawk Drive.
- 1995 - An underpass beneath Mohawk Drive was constructed.
- 1996 - Flood capacity improvements, trail connections and underpasses beneath Martin Drive and Moorhead Avenue were constructed. In cooperation with the Urban Drainage and Flood Control District, additional flood improvements were completed and a pedestrian and bicycle underpass was added at Gilpin Drive.
- 1998 - The City modified Martin Park to provide 100-year flood containment, removing approximately 200 properties from the 100-year floodplain. The project also provided storm water quality opportunities for a major storm sewer outfall into Bear Canyon Creek and a nature education area near Creekside Elementary School. A pedestrian/bicycle underpass and associated flood improvements were completed at South Broadway.
- 2000 – Construction of a path connection on east side of Broadway from 36th Street to the Bear Creek path.
- 2003 - Improvements to the levee along Bear Canyon Creek on Harrison Drive and capacity improvements along Foothills Parkway were completed in conjunction with the development of the new hospital site at Foothills and Arapahoe.
- Martin Park west bank plantings in 2004-2006
- 2007 – Construction of a new bicycle/pedestrian underpass and flood mitigation improvements at Foothills and Arapahoe.
- 2009 – City Council accepted a Letter of Map Revision (LOMR) for Bear Canyon Creek from Foothills Parkway to Boulder Creek. The LOMR was prepared to reflect new mapping, an underpass at Arapahoe Avenue, and improvements to the Harrison Avenue Levee.

**South Boulder Creek**

- 1991 - The Greenways Program began work in the South Boulder Creek corridor with trail construction between 55th Avenue and Central Avenue. The project included a new bridge and low water crossing. Also in 1991, a trail was constructed between Central Avenue and the Stazio Ballfields. This project included a low water crossing and a railroad underpass.
- 1992 - The trail was extended around Valmont Reservoir to Valmont Road and an underpass beneath Valmont Road was constructed. In conjunction with this effort, the creek channel was restored to its natural configuration, wetlands were created and riparian vegetation was planted. Paved trail construction, a railroad underpass, and wetlands creation efforts were completed between the Stazio Ball Fields and Arapahoe Road.
- 1993 - A trail underpass was constructed beneath Arapahoe Road. A new trail bridge and soft-surface trail approaches were created from the South Boulder Creek corridor west toward the East Boulder Community Center.
- 1997 - The Greenways Program constructed a trail underpass beneath Baseline Road and completed the trail connection between South Boulder Creek and the East Boulder Community Center.
- 2000 – Construction of stream bank and trail restoration at Baseline Road through UDFCD funding.
- 2007 – The South Boulder Creek (SBC) Flood Mapping Study was completed and submitted to the Federal Emergency Management Agency (FEMA). Staff began regulating to the SBC study's revised floodplain areas on January 1, 2008. It is anticipated that FEMA will approve the revised floodplain mapping in early 2010.
- 2005 – McGinn Fish Passage survey.
- 2007 – McGinn Fish passage structure, joint project with Open Space and Mountain Parks.
- 2007 – A flood mapping study was completed for South Boulder Creek. FEMA anticipates formal adoption in late 2011.
- 2010 – The City initiated a flood mitigation planning study for South Boulder Creek. The study will focus on mitigating flood damages in the West Valley area. It is anticipated the study will be completed in 2011.

**Gregory Canyon Creek**

- 2008 – The City completed a flood mapping study of Gregory Canyon Creek. FEMA approved the mapping in 2010.

**Dry Creek No.2**

- Habitat restoration through golf course - 2008

## *1.4 Existing Conditions*

**Table 1-2** presents a summary of existing greenways improvements. **Table 1-3** presents a summary of existing conditions along Boulder Creek and the tributaries. The summary of existing conditions was developed in part based on a historic and cultural resources inventory and environmental assessments. Information in these tables is used to help identify project opportunities and when developing a Community Environmental Assessment Process report for proposed project features.

## Historic and Cultural Resources Inventory

A cultural resource inventory of the Greenways corridors was completed prior to the 2001 update (**Appendix II**).

Historic resources are defined as buildings, structures, sites, or areas of historical, architectural, and/or environmental significance to the City of Boulder. The city recognizes and protects historic resources under Title 10 - Section 13 of the Boulder Revised Code. Historic resources generally fall into one or more of the following categories:

- Sites or structures recognized by the City as individual landmarks
- Sites or structures that contribute to locally designated historic districts
- Sites or structures that contribute to potential local historic districts
- Sites or structures deemed eligible for local land marking

As of January 2011, there are ten local historic districts and 165 individual historic landmarks within the city. In addition, the City has identified several potential historic districts and completed surveys of potentially significant historic resources throughout many of the older neighborhoods.

The existing Greenways system contains one individual landmark, the Boyd Smelter Site, and several sites and structures that are considered eligible for local land marking. In addition, the Boulder Creek Corridor passes through the potential Highland Lawn historic district. Drainages added to the Greenways system in the future may pass through other potential historic districts.

In addition, Boulder's early settlers and Native American populations used the area's creeks, streams, and tributaries to help determine transportation routes and settlement patterns. The Greenways system therefore contains some of Boulder's oldest and most valuable historic resources. The city, through its Historic Building Inventory Record, has identified and documented many historic buildings and sites along the Greenways corridors. Histories of the Silver Lake, Anderson and Farmers Ditches have been published. However, relatively little has been done to identify, document and preserve Boulder's archaeological and cultural heritage.

## Terrestrial and Aquatic Habitat Inventories

The status of terrestrial habitat within the drainages included in the Greenways Program was assessed and mapped in 1999 (*"Greenways Riparian Habitat Assessment*," October 23, 1999). This assessment included a rating of the existing vegetation structure, native plant habitat, and bird habitat for all stream reaches within the City of Boulder. The terrestrial habitat inventory provides the baseline against which future Greenways projects may be evaluated and has identified opportunities for preservation of high quality habitat and habitat restoration throughout the Greenways system.

The city has also evaluated aquatic habitat in the stream reaches included in the Greenways Program. Data are available concerning existing conditions for primary (streambed), secondary (channel morphology) and tertiary (bank stability) aquatic habitat characteristics, as well as vegetative bank stability (*"City of Boulder Aquatic Habitat Assessment,"* 1995). These data have been used to identify opportunities for aquatic habitat preservation and enhancement

through Greenways projects. A survey was done in 2010 along many of the tributary reaches to update the aquatic habitat inventory including Fourmile Canyon Creek, Two Mile Canyon Creek, Boulder Creek, Skunk Creek, Bear Canyon Creek, South Boulder Creek and Goose Creek. Reach Inventories (Appendix III) have been updated to reflect the 2010 survey. Any proposed project along the 2010 survey reaches should review the full survey available through the Public Works Water Quality Office.

**Table 1-2: Existing Greenways Improvements**

| Item | Boulder Creek | Fourmile Canyon | Wonderland | Goose | Skunk | Bear Canyon | South Boulder | Elmer's Two Mile | Bluebell Canyon | Dry Creek No. 2 | Gregory Canyon | Kings Gulch | Sunshine | Two Mile Canyon | Viele Canal | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Existing Trail (Linear Feet) | 35,024 | 13,059 | 12,687 | 19,061 | 12,843 | 16,985 | 10,588 | 4,638 | 0 | 3,648 | 0 | 0 | 1,076 | 2,234 | 1,379 | **133,222** |
| Existing Underpasses | 16 | 6 | 5 | 9 | 11 | 8 | 4 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | **63** |
| Existing Bridges | 17 | 1 | 3 | 2 | 3 | 5 | 10 | 0 | 0 | 1 | 0 | 0 | 0 | 2 | 1 | **45** |
| Restoration (sq. ft.) | 331,026 | 159,544 | 202,886 | 936,350 | 162,233 | 242,014 | 0 | 154,317 | 0 | 1,354,100 | 0 | 0 | 0 | 0 | 0 | **3,542,470** |
| Preservation (sq.ft.) | 853,822 | 530,660 | 616,873 | 101,577 | 1,209,267 | 847,891 | 3,417,529 | 75,964 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **7,653,583** |
| Restoration/ Preservation (sq.ft.) | 5,063,904 | 526,751 | 200,991 | 337,774 | 0 | 494,024 | 1,003,971 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **7,627,414** |
| Existing Water Quality BMPs | 1 | 0 | 0 | 0 | 1 | 3 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | **7** |

## Table 1-3: Tributary Greenways Inventory of Existing Conditions

| Inventory Reach | Geographical Description | Env. Assessment Reach | Trail | | | | | Flood Mitigation | Aquatic Habitat | Terrestrial Habitat | | | Passive Recreation | | | | Cultural/Historic Resources | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Paved | Unpaved | None | At-Grade Crossing | Grade-Separated Crossing | 100-year Containment and/or no existing structure impacts | | Native Plant Habitat | Vegetative Structure | Bird Species Richness | Rest stop | Drinking Fountain | Connection to Park | Landmark or Site Eligible | Existing Historic District | Potential Historic District | Other Cultural/Historic Resource | Connection to Urban Center |
| **Boulder Creek** | | | | | | | | | | | | | | | | | | | | |
| BC7 | Fourmile Canyon to Eben Fine | BC02-06 | √ | √ | | | | | Suboptimal[1] | G-VG | G-VG | P-VG | | √ | √ | √ | √ | | | |
| BC7 | Eben Fine to 6th St. | BC09 | √ | √ | | | | | | P | VG | P | | √ | √ | | | | | |
| BC7 | White Water Course | BC03 | √ | | | | | | | VG | VG | P | | | √ | | | | | |
| BC7 | Boyd Smelter Site | BC09 | √ | | | | | | | P | VG | P | | | | | √ | | | |
| BC7 | 6th Crossing | BC09 | √ | | | | √ | √ | | P | VG | P | | | | | | | | √ |
| BC7 | 6th to 9th | BC12 | √ | √ | | | | | | P | VG | VP | | | √ | √ | | | | |
| BC7 | Sculpture Garden | BC12 | √ | | | | | | | P | VG | VP | | | √ | | | | √ | |
| BC7 | 9th Crossing | BC12/15** | √ | | | | √ | | | P-G | G-VG | VP-G | | | | | | | | √ |
| BC7 | 9th to Broadway | BC15-17 | √ | √ | | | | | | P-G | G | P-G | | √ | √ | | | | | |
| BC7 | Broadway Crossing | BC17 | √ | | | | √ | | | P | G | P | | | | | | | | √ |
| BC7 | Broadway Bridge | BC17 | √ | | | | | | | P | G | P | | | | | | | √ | |
| BC7 | 13th/Arapahoe Rest | BC17 | √ | | | | | | | P | G | P | √ | √ | | | | | | |
| BC7 | Arapahoe Crossing | BC17 | √ | | | | √ | | | P | G | P | | | | | | | | |

[1] 2001 habitat rankings: VP = very poor, P = poor, F = Fair, G = good, VG = very good, E = excellent. 2010 aquatic habitat rankings: Optimal, Suboptimal, marginal. Any proposed project in the 2010 reaches should refer to the full assessment available from the Public Works Water Quality Office

** These designations refer to the approximate boundary between reaches.

| Inventory Reach | Geographical Description | Env. Assessment Reach | Trail | | | | | Flood Mitigation | Aquatic Habitat | Terrestrial Habitat | | | Passive Recreation | | | | Cultural/Historic Resources | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Paved | Unpaved | None | At-Grade Crossing | Grade-Separated Crossing | 100-year Containment and/or no existing structure impacts | | Native Plant Habitat | Vegetative Structure | Bird Species Richness | Rest stop | Drinking Fountain | Connection to Park | Landmark or Site Eligible | Existing Historic District | Potential Historic District | Other Cultural/Historic Resource | Connection to Urban Center |
| BC7/BC6 | Broadway to 17th | BC17-22 | √ | | | | | | Suboptimal[1] | P-G | G-VG | P | √ | | √ | | | | | √ |
| BC6 | 17th St. Bridge | BC22 | √ | | | | | | | P | VG | P | | | | | | | √ | |
| BC7 | Farmers' Market | BC17 | √ | | | | | | | P | G | p | | | | | | | √ | |
| BC7 | Dushanbe Teahouse | BC17 | √ | | | | | | | P | G | P | | | | | | | √ | |
| BC7/BC6 | Boulder High School | BC19-22 | √ | | | | | | | P-G | G-VG | P | | | | | | | √ | |
| BC6 | 17th to Folsom | BC22-28 | √ | | | | | | | G | P-VG | P | √ | | | | | | | √ |
| BC6/BC5 | Folsom Crossing | BC30 | √ | | | | √ | | | VP | G | P | | | | | | | | |
| BC5 | Folsom to 28th | BC30-32 | √ | | | | | | | VP-P | G | VP-P | | √ | | | | √ | | √ |
| BC5 | 28th Crossing | BC32 | √ | | | | √ | | | P | G | VP | | | | | | | | |
| BC5 | 28th to 30th | BC32-34 | √ | | | | | | | P | G | VP-G | | √ | √ | | | | √ | √ |
| BC5/BC4 | 30th Crossing | BC37 | √ | | | | √ | | | VP | VG | G | | | | | | | | |
| BC4 | 30th to Arapahoe | BC37-42 | √ | | | | | | | VP | VG | P-VG | | | | | | | | |
| BC4/BC3 | Arapahoe Crossing | BC42 | √ | | | | √ | | | VP | VG | VG | | | | | | | | |
| BC3 | Arapahoe to Foothills | BC45 | √ | √ | | | | | | VP | G | P | | | | | | | | |
| BC3/BC2 | Foothills Crossing | BC47 | √ | | | | √ | | Optimal[1] | P | G | G | | | | | | | | √ |
| BC2 | Foothills to Goose | BC47-50 | √ | | | | | | | P-G | G | P-G | √ | √ | | | | | | |
| BC1 | Goose to 55th | BC51 | √ | | | | | | Suboptimal[1] | P | VG | G | √ | | | | | | | |
| BC1 | 55th Crossing | | √ | | | | √ | | | | | | | | | | | | | |

| Inventory Reach | Geographical Description | Env. Assessment Reach | Trail | | | | | Flood Mitigation | Aquatic Habitat | Terrestrial Habitat | | | Passive Recreation | | | | Cultural/Historic Resources | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Paved | Unpaved | None | At-Grade Crossing | Grade-Separated Crossing | 100-year Containment and/or no existing structure impacts | | Native Plant Habitat | Vegetative Structure | Bird Species Richness | Rest stop | Drinking Fountain | Connection to Park | Landmark or Site Eligible | Existing Historic District | Potential Historic District | Other Cultural/Historic Resource | Connection to Urban Center |
| BC1 | Pearl Parkway Bridge | | √ | | | | √ | | Suboptimal[1] | | | | | | | | | | | |
| BC1 | Pearl Parkway | | √ | | | | √ | | | | | | | | | | | | | |
| **Fourmile Canyon Creek** | | | | | | | | | | | | | | | | | | | | |
| FC5 | West of Broadway | FC01 | √ | | | | | | F | VG | P | P | | | | | | | √ | |
| FC5 | Broadway Crossing | FC03 | √ | | | | √ | | F | G | G | P | | | | | | | √ | |
| FC5/FC4 | Broadway to Violet | FC03-05 | | √ | | | | | F | P-G | G-VG | P-G | | | | | | | | |
| FC4 | Violet Crossing | FC05 | | √ | | | | | F | P | VG | G | | | | | | | | |
| FC4 | Violet to 19th | FC05-07 | | √ | | | | | F | P-G | VG | P-G | | | | | | | | |
| FC4/FC3 | 19th Crossing | FC07 | | √ | | | | | F | G | VG | P | | | | | | | | |
| FC3 | 19th to 26th | FC07-12 | | √ | | | | | Marginal[1] | VP-G | G-VG | P-G | | | | | | | √ | |
| FC3 | Tamarack to Riverside | FC11 | √ | | | | | | | P | G | G | | | | | | | | |
| FC3 | 26th Crossing | FC12 | | √ | | | | | | VP | G | P | | | | | | | | |
| FC3 | 26th to 28th | FC12-14 | | | | | | | | VP-P | G | P | | | √ | | | | | |
| FC3/FC2 | 28th Crossing | FC14 | √ | | | | √ | | | P | G | P | | | | | | | | |
| FC2 | 28th to 30th | FC14-15 | √ | | | | | | Suboptimal[1] | P-G | G | P-G | | | | | | | | |
| FC2 | 30th Crossing | FC15 | √ | | | | √ | √ | | G | G | G | | | | | | | | |
| FC2/FC1 | 30th to 47th | FC15-16 | √ | | | | | √ | | P-G | G | G-VG | | √ | √ | | | | | |

| Inventory Reach | Geographical Description | Env. Assessment Reach | Trail | | | | | Flood Mitigation | Aquatic Habitat | Terrestrial Habitat | | | Passive Recreation | | | | Cultural/Historic Resources | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Paved | Unpaved | None | At-Grade Crossing | Grade-Separated Crossing | 100-year Containment and/or no existing structure impacts | | Native Plant Habitat | Vegetative Structure | Bird Species Richness | Rest stop | Drinking Fountain | Connection to Park | Landmark or Site Eligible | Existing Historic District | Potential Historic District | Other Cultural/Historic Resource | Connection to Urban Center |
| FC2/FC1 | 47th Crossing | FC16 | √ | | | | √ | | Suboptimal[1] | P | G | VG | | | | | | | | |
| FC1 | 47th to Diagonal | FC16 | √ | | | | | √ | | P | G | VG | | | | | | | | |
| FC1 | Diagonal Southbound Crossing | | √ | | | | √ | √ | | | | | | | | | | | | |
| FC1 | Diagonal Northbound Crossing | | √ | | | | √ | √ | | | | | | | | | | | | |
| FC1 | Diagonal to RR | | √ | | | | | √ | | | | | | | | | | | | |
| FC1 | RR Crossing | | | | √ | | | | | | | | | | | | | | | |
| **Wonderland Creek** | | | | | | | | | | | | | | | | | | | | |
| WC8 | West of Broadway | WC01 | √ | √ | | | | √ | G | P | G | P | | | √ | | | | √ | |
| WC8/WC7 | Broadway Crossing | WC01 | √ | | | | √ | √ | G | P | G | P | | | | | | | | |
| WC7/WC6 | Broadway to 19th | WC01-03 | | | √ | | | | F-G | P-G | P-G | P-G | | | | | | | | |
| WC7/WC6 | 15th Crossing | WC01/02 | | | | √ | | | F-G | P | G | P-G | | | | | | | | |
| WC6/WC5 | 19th to 26th | WC03-06 | | | √ | | | | F | G | P-G | P-G | | | | | | | √ | √ |
| WC5/WC4 | 26th Crossing | WC06 | | | | √ | | | F | G | G | G | | | | | | | √ | |
| WC4 | 26th to 28th | WC06-08 | √ | | | | | | P-F | G | VP-G | G | | | | | | | √ | |
| WC4/WC3 | 28th Crossing | WC08 | | | | √ | | | | | | | | | | | | | | |
| WC3 | 28th to Kalmia | WC08-09 | √ | | | | | | P | P | G | P | | | | | | | | |

| Inventory Reach | Geographical Description | Env. Assessment Reach | Trail | | | | | Flood Mitigation | Aquatic Habitat | Terrestrial Habitat | | | Passive Recreation | | | | Cultural/Historic Resources | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Paved | Unpaved | None | At-Grade Crossing | Grade-Separated Crossing | 100-year Containment and/or no existing structure impacts | | Native Plant Habitat | Vegetative Structure | Bird Species Richness | Rest stop | Drinking Fountain | Connection to Park | Landmark or Site Eligible | Existing Historic District | Potential Historic District | Other Cultural/Historic Resource | Connection to Urban Center |
| WC3 | Paseo del Prado | WC09 | √ | | | | | | P | P | G | P | | | | | | | | |
| WC3 | Kalmia Crossing | WC09 | | | | √ | | | P | P | G | P | | | | | | | | |
| WC3 | Kalmia to Diagonal | WC09-10 | √ | | | | | | P-F | P | G | P | | | | | | | | |
| WC3 | Diagonal Crossing | WC09-10 | √ | | | | √ | | | | | | | | | | | | | |
| WC3 | Diagonal to Foothills | WC10-13 | | √ | | | | | P-F | P-E | P-VG | VP-P | | | | | | | | |
| WC3 | Iris Crossing | WC11 | | √ | | | | | P | G | G | VP | | | | | | | | |
| WC3 | 34th Crossing | WC11 | | √ | | | | | P | G | G | VP | | | | | | | | |
| WC3/WC2 | RR Crossing | WC13 | | √ | | | | | P | E | P | P | | | | | | | | |
| WC2 | Foothills Crossing | WC13 | √ | | | | √ | √ | P | E | P | P | | | | | | | | |
| WC2 | 47th Crossing | WC13 | | | | √ | | √ | P | E | P | P | | | | | | | | |
| WC2 | Foothills to Valmont | WC13-15 | √ | | | | | √ | P | VG-E | P-G | VP-P | | | √ | | | | | |
| WC2 | Kings Ridge Crossing | WC15 | | | | √ | | √ | P | VG | P | VP | | | | | | | | |
| WC2/WC1 | Valmont Crossing | WC15 | √ | | | | √ | √ | P | VG | P | VP | | | | | | | | |
| WC1 | Valmont to No. Goose | WC15-16 | √ | | | | | √ | P | P-VG | P | VP-P | | √ | √ | | | | | |
| **Goose Creek** | | | | | | | | | | | | | | | | | | | | |
| GC6 | Edgewood to Folsom | GC01-04 | √ | | | | | | Marginal[1] | VP-P | P-VG | P-G | | | | | | | | |
| GC6/GC5 | Folsom Crossing | GC04 | √ | | | | √ | √ | | P | VG | P | | | | | | | | |
| GC5 | Folsom to 28th | GC04-05 | √ | | | | | √ | Suboptimal[1] | P | VG | P | | | | | | | √ | |

| Inventory Reach | Geographical Description | Env. Assessment Reach | Trail | | | | | Flood Mitigation | Aquatic Habitat | Terrestrial Habitat | | | Passive Recreation | | | | Cultural/Historic Resources | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Paved | Unpaved | None | At-Grade Crossing | Grade-Separated Crossing | 100-year Containment and/or no existing structure impacts | | Native Plant Habitat | Vegetative Structure | Bird Species Richness | Rest stop | Drinking Fountain | Connection to Park | Landmark or Site Eligible | Existing Historic District | Potential Historic District | Other Cultural/Historic Resource | Connection to Urban Center |
| GC5/GC4 | 28th Crossing | GC05 | √ | | | | √ | √ | Suboptimal[1] | | | | | | | | | | | |
| GC4 | 28th to 30th | GC07 | √ | | | | | √ | | P | VP | G | | | √ | | | | | |
| GC4 | 30th Crossing | GC07 | √ | | | | √ | √ | | P | VP | G | | | | | | | | |
| GC4/GC3 | 30th to Foothills | GC07-13 | √ | | | | | √ | | P-E | VP- | G | | | | | | | √ | |
| GC4/GC3 | RR Crossing | GC13 | √ | | | | √ | √ | | P | VP | | | | | | | | √ | |
| GC3/GC1 | Foothills Crossing | GC13 | √ | | | | √ | √ | | P | VP | | | | | | | | | |
| **North Goose Creek** | | | | | | | | | | | | | | | | | | | | |
| GC1 | Foothills to Wonderland | | √ | | | | | √ | | | | | | | √ | | | | | |
| GC1 | Wonderland to Boulder Creek | | √ | | | | | √ | | | | | | | | | | | | |
| GC1 | Pearl Parkway Crossing | | √ | | | | √ | √ | | | | | | | | | | | | |
| **South Goose Creek** | | | | | | | | | | | | | | | | | | | | |
| GC2 | Foothills to Boulder Creek | GC13-16 | √ | | | | | √ | Marginal[1] | P-VG | VP | | | | | | | | | |
| GC2 | Foothills Crossing | | √ | | | | √ | √ | | | | | | | | | | | | |
| GC2 | 48th Crossing | GC14 | | | | √ | | √ | | VG | VP | | | | | | | | | |
| GC2 | Rest Area | GC14 | √ | | | | | √ | | VG | VP | | √ | √ | | | | | | |

| Inventory Reach | Geographical Description | Env. Assessment Reach | Trail | | | | | Flood Mitigation | Aquatic Habitat | Terrestrial Habitat | | | Passive Recreation | | | | Cultural/Historic Resources | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Paved | Unpaved | None | At-Grade Crossing | Grade-Separated Crossing | 100-year Containment and/or no existing structure impacts | | Native Plant Habitat | Vegetative Structure | Bird Species Richness | Rest stop | Drinking Fountain | Connection to Park | Landmark or Site Eligible | Existing Historic District | Potential Historic District | Other Cultural/Historic Resource | Connection to Urban Center |
| **Elmer's Two Mile Creek** | | | | | | | | | | | | | | | | | | | | |
| ET1 | 26th to Juniper | ET02 | | | √ | | | | P | VP | P | P | | | | | | | | |
| ET1 | Juniper to Iris | ET02 | √ | | | | √ | | | | | | | | | | | | | |
| ET1 | 26th Crossing | ET02 | | | | √ | | | P | VP | P | P | | | | | | | | |
| ET1 | Iris Crossing | ET02 | √ | | | | | √ | P | VP | P | P | | | | | | | | |
| ET1 | Iris to Glenwood | ET02-04 | √ | | | | | √ | P | VP-P | VP-G | P | | | √ | | | | | |
| ET1 | Glenwood Crossing | ET04 | | | | √ | | √ | P | VP | G | P | | | | | | | | |
| ET1 | Glenwood to Valmont | ET04-05 | √ | | | | | √ | P | VP- | G | P | | | | | | | | |
| ET1 | Valmont Crossing | ET05 | √ | | | | √ | √ | P | G | G | P | | | | | | | | |
| ET1 | Valmont to Goose | ET05 | √ | | | | | √ | P | G | G | P | | | | | | | | |
| **Skunk Creek** | | | | | | | | | | | | | | | | | | | | |
| SC5 | Hollyberry to NOAA | SC01-04 | √ | | | | | | Marginal[1] | VP-E | P-VG | P-E | | | | | | | √ | |
| SC5 | NOAA to Broadway | SC06 | | | √ | | | | | VP | G | P | | | | | | | | |
| SC5/SC4 | Broadway Crossing | SC06 | √ | | | | √ | | | VP | G | P | | | | | | | | |
| SC4 | 27th Crossing | SC07 | √ | | | | √ | | | P | VG | P | | | | | | | | |
| SC4 | Moorhead Crossing | SC07 | | | | √ | | | | P | VG | P | | | | | | | | |
| SC4/SC3 | Highway 36 Crossing | SC07 | √ | | | | √ | | | P | VG | P | | | | | | | | |

| Inventory Reach | Geographical Description | Env. Assessment Reach | Trail | | | | | Flood Mitigation | Aquatic Habitat | Terrestrial Habitat | | | Passive Recreation | | | | Cultural/Historic Resources | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Paved | Unpaved | None | At-Grade Crossing | Grade-Separated Crossing | 100-year Containment and/or no existing structure impacts | | Native Plant Habitat | Vegetative Structure | Bird Species Richness | Rest stop | Drinking Fountain | Connection to Park | Landmark or Site Eligible | Existing Historic District | Potential Historic District | Other Cultural/Historic Resource | Connection to Urban Center |
| SC4/SC3 | Moorhead to Baseline | SC07 | | | √ | | | | Marginal[1] | P | VG | P | | | | | | | | |
| SC3 | Baseline Crossing | SC07/08 | √ | | | | √ | | | VP-P | VG | VP-P | | | | | | | | |
| SC3 | 29th Crossing | SC08 | | | √ | | | | | VP | VG | VP | | | | | | | | |
| SC3 | Baseline to 30th St. | SC08-10 | | | √ | | | | | VP-P | G-VG | VP-G | | | | | | | | |
| SC3 | 28th Street On-ramp | SC07/08 | √ | | | | √ | | | VP-P | VG | VP-P | | | | | | | | |
| SC3/SC2 | 30th to Colorado | SC10-12 | | | √ | | | | | P | G-VG | G-VG | | | | | | | | |
| SC3 | 30th Crossing | SC10 | | | √ | | | | | P | G | G | | | | | | | | |
| SC3 | Aurora Crossing | SC12 | | | √ | | | | | P | VG | VG | | | | | | | | |
| SC2 | Colorado Crossing | SC16 | √ | | | | √ | | Suboptimal[1] | VG | G | G | | | | | | | | |
| SC2/SC1 | Colorado to Research Park | SC16-19 | √ | | | | | √ | | P-E | P-G | VG | | | | | | | √ | √ |
| SC2 | Discovery Crossing | SC18 | √ | | | | √ | √ | | E | P | VG | | | | | | | | |
| SC1 | Boulder Creek Rest Area | BC42 | √ | | | | | √ | | VP | VG | VG | √ | | | | | | | |
| **Bear Creek Canyon** | | | | | | | | | | | | | | | | | | | | |
| BCC6 | Mountains to Lehigh | BRC01-06 | | | √ | | | | Optimal[1] | P-E | P-VG | P-G | | | | | | | | |
| BCC5/ BCC4 | Lehigh to Broadway | BRC06-11 | | | √ | | | | Suboptimal[1] | P | P | VP-G | | | | | | | | |
| BCC4 | Broadway Crossing | BRC11/12 | √ | | | | √ | √ | | P-G | P-G | P-G | | | | | | | | |

| Inventory Reach | Geographical Description | Env. Assessment Reach | Trail | | | | | Flood Mitigation | Aquatic Habitat | Terrestrial Habitat | | | Passive Recreation | | | | Cultural/Historic Resources | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Paved | Unpaved | None | At-Grade Crossing | Grade-Separated Crossing | 100-year Containment and/or no existing structure impacts | | Native Plant Habitat | Vegetative Structure | Bird Species Richness | Rest stop | Drinking Fountain | Connection to Park | Landmark or Site Eligible | Existing Historic District | Potential Historic District | Other Cultural/Historic Resource | Connection to Urban Center |
| BCC4 | Broadway to Martin | BRC12-16 | √ | | | | | √ | Suboptimal[1] | P-G | G | VP-P | | √ | √ | | | | | |
| BCC4 | Martin Crossing | BRC16 | √ | | | | √ | √ | | | | | | | | | | | | |
| BCC4/ BCC3 | Martin to Moorhead | BRC16 | √ | | | | | | | | | | | | | | | | | |
| BCC3 | Moorhead Crossing | BRC16/18 | √ | | | | √ | √ | | P | VG | G | | | | | | | | |
| BCC3 | Moorhead to Highway | BRC18 | √ | | | | | | | P | VG | G | | | | | | | | |
| BCC3 | Highway 36 Crossing | BRC18 | √ | | | | √ | | | P | VG | G | | | | | | | | |
| BCC3 | Highway 36 to Baseline | BRC18-22 | √ | | | | | | | P-G | VG | G | | | | | | | | √ |
| BCC3/ BCC2) | Baseline Crossing | BRC22 | √ | | | | √ | | | G | VG | VP | | | | | | | | |
| BCC2 | Baseline to Gilpin | BRC22-24 | √ | | | | | | | G | G-VG | VP | | | √ | | | | | |
| BCC2 | Gilpin Crossing | BRC24 | √ | | | | √ | | | G | G | VP | | | | | | | | |
| BCC2 | Gilpin to Mohawk | BRC24-27 | √ | | | | | | | P-G | G | VP-P | | | √ | | | | | |
| BCC2 | Mohawk Crossing | BRC27 | √ | | | | √ | | | P | G | P | | | | | | | | |
| BCC2 | Mohawk to Colorado | BRC27-29 | √ | | | | | | | VP-P | G | P | | | √ | | | | | |
| BCC1 | Foothills Crossing | BRC29 | √ | | | | √ | √ | | VP | G | P | | | | | | | √ | |
| BCC1 | Colorado to Arapahoe | BRC30-32 | √ | | | | | | | P | G | VP-G | | | | | | | √ | √ |

| Inventory Reach | Geographical Description | Env. Assessment Reach | Trail | | | | | Flood Mitigation | Aquatic Habitat | Terrestrial Habitat | | | Passive Recreation | | | | Cultural/Historic Resources | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Paved | Unpaved | None | At-Grade Crossing | Grade-Separated Crossing | 100-year Containment and/or no existing structure impacts | | Native Plant Habitat | Vegetative Structure | Bird Species Richness | Rest stop | Drinking Fountain | Connection to Park | Landmark or Site Eligible | Existing Historic District | Potential Historic District | Other Cultural/Historic Resource | Connection to Urban Center |
| BCC1 | Arapahoe to Boulder Creek | | √ | | | | | | Suboptimal[1] | | | | | | | | | | | |
| BCC1 | Arapahoe Crossing | | √ | | | | √ | | | | | | | | | | | | | |
| **South Boulder Creek** | | | | | | | | | | | | | | | | | | | | |
| | Broadway to Highway 36 | | | √ | | | | | | | | | | | | | | | √ | |
| | Highway 36 to South Boulder Road | | | √ | | | | | | | | | | | | | | | √ | |
| | Highway 36 Crossing | | | √ | | | √ | | | | | | | | | | | | √ | |
| SBC4 | South Boulder Rd. Crossing | | | √ | | | √ | | Optimal[1] | | | | | | | | | | | |
| SBC4 | South Boulder Rd. to Baseline | SBC00-08 | √ | √ | | | | | | VG-E | G-VG | G-VG | | √ | √ | | | | | |
| SBC4/ SBC3 | Baseline Crossing | SBC08/09 | √ | | | | √ | | | VG | G-VG | VG | | | | | | | | |
| SBC3 | Baseline to Wellman Canal | SBC09-13 | √ | | √ | | | | Suboptimal[1] | P-VG | G | G-VG | | | √ | | | | √ | |
| SBC3 | Wellman Canal to Arapahoe | SBC13-19 | | | √ | | | | | VP-G | G-VG | G | | | | | | | √ | |
| SBC3/ SBC2 | Arapahoe Crossing | SBC19 | √ | | | | √ | | | G | VG | G | | | | | | | | |

| Inventory Reach | Geographical Description | Env. Assessment Reach | Trail | | | | | Flood Mitigation | Aquatic Habitat | Terrestrial Habitat | | | Passive Recreation | | | | Cultural/Historic Resources | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Paved | Unpaved | None | At-Grade Crossing | Grade-Separated Crossing | 100-year Containment and/or no existing structure impacts | | Native Plant Habitat | Vegetative Structure | Bird Species Richness | Rest stop | Drinking Fountain | Connection to Park | Landmark or Site Eligible | Existing Historic District | Potential Historic District | Other Cultural/Historic Resource | Connection to Urban Center |
| SBC2 | Arapahoe to Stazio | SBC19-2.1 | √ | | | | | | Suboptimal[1] | G | P-VG | G | | | √ | | | | √ | |
| SBC2 | RR Crossing | SBC1.1 | √ | | | | √ | | | G | P | VG | | | | | | | √ | |
| SBC2 | Stazio to Central | SBC2.1-3.1 | √ | | | | | | | G- | G | G-VG | | | √ | | | | √ | |
| SBC2 | Stazio Connection | SBC2.1/3.1 | √ | | | | | | | G- | G | G-VG | | √ | | | | | | |
| SBC1 | Valmont Crossing | SBC3.1/4.1 | √ | | | | √ | | | VG | G | VG | | | | | | | | |
| **Bluebell Canyon Creek** | | | | | | | | | | | | | | | | | | | | |
| BLC1 | 20th to 16th Street | BLC02-01 | | | √ | | | | | G | VG | | | | | | | | | |
| BLC2 | 16th to 12th Street | BLC02-01 | | | √ | | | | F | P | G | G | | | | | | | | |
| **Dry Creek No. 2** | | | | | | | | | | | | | | | | | | | | |
| DC1 | Central Ave to Arapahoe Ave | DC 10 to 15 | | | √ | | | | F-P | VG-G | P | G-P | | | | | | | | |
| DC2 | Arapahoe to 55th St | DC 3 to 9 | | | √ | | | | G-P | E-VP | G-VP | G-P | | | | | | | | |
| DC3 | 55th to Baseline Rd | DC01-02 | | | √ | | | | P | G | G | P | | | | | | | | |
| **Gregory Canyon Creek** | | | | | | | | | | | | | | | | | | | | |
| GRC1 | Boulder Creek to College Avenue | GRC 5 to 10 | | | √ | | | | F-P | P | E-G | P-VP | | | | | | | | |
| GRC2 | College Avenue to City limits | GRC 1 to 3 | | | √ | | | | F-P | G | VG | VG-G | | | | | | | | |

| Inventory Reach | Geographical Description | Env. Assessment Reach | Trail | | | | | Flood Mitigation | Aquatic Habitat | Terrestrial Habitat | | | Passive Recreation | | | | Cultural/Historic Resources | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Paved | Unpaved | None | At-Grade Crossing | Grade-Separated Crossing | 100-year Containment and/or no existing structure impacts | | Native Plant Habitat | Vegetative Structure | Bird Species Richness | Rest stop | Drinking Fountain | Connection to Park | Landmark or Site Eligible | Existing Historic District | Potential Historic District | Other Cultural/Historic Resource | Connection to Urban Center |
| **Sunshine Creek** | | | | | | | | | | | | | | | | | | | | |
| SNC1 | Boulder Creek to City limits | SNC 3 to 5 | √[1] | | | √ | | | F | G-VP | VG-G | P | | | | | | | | |
| **Two Mile Canyon Creek** | | | | | | | | | | | | | | | | | | | | |
| TMC1 | 15th St to City limits | TMC 1 to 7 | √[2] | | | √ | | | P | P-VP | E-VG | P | | | | | | | | |
| **Viele Channel** | | | | | | | | | | | | | | | | | | | | |
| VC1 | Viele Lake to South Boulder Creek | No inventory | √[3] | | | | √ | | | | | | | | | | | | | |
| **Kings Gulch** | | | | | | | | | | | | | | | | | | | | |
| KG1 | Skunk Creek to City limits | No inventory | | | √ | | | | | | | | | | | | | | | |

[1] Paved path from Spruce to Pearl
[2] Paved path from 9th to 15th
[3] Paved path from Grinnel to Broadway

# 2 Key Policies / Issues

The Greenways Master Plan builds on policies outlined in several adopted plans including the Boulder Valley Comprehensive Plan, the Comprehensive Flood and Stormwater Utility Master Plan, the Transportation Master Plan, Parks and Recreation Master Plan, the Water Quality Strategic Plan, subcommunity plans and stream specific flood mitigation plans. In addition, Boulder Revised Code requires securing a floodplain development permit and wetlands permit for most Greenways Improvement projects. This chapter presents a summary of the current plans and permits that affect implementation of Greenways projects.

## *2.1 Master Plans and Policies*

**Boulder Valley Comprehensive Master Plan (BVCP)**

Implementation of the Greenways Program seeks to address the following policies of the Boulder Valley Comprehensive Plan as presented in the 2005 update (it should be noted that the BVCP is being updated in 2011):

Policy 2.29 Urban Open Lands
Open lands within the fabric of the city provide recreational opportunities and density relief from the confines of the city, as well as protection of the environmental quality of the urban environment. The City will promote and maintain an urban open lands system to serve the following functions: active and passive recreation, environmental protection, flood management, bike/pedestrian connections and enhancement of community character.

Policy 2.30 Boulder Creek and its Tributaries as Important Urban Design Features
Boulder Creek and its tributaries will serve as unifying urban design features for the community. Within available appropriations, the City and county will support the preservation or reclamation of the creek corridors for natural ecosystems, wildlife habitat and cultural resources; for recreation or trails; to provide flood management; to improve air and water quality; and to provide a contrast to urban development. Trail development will be sensitive to the ecology, terrain and privacy of adjacent residents and surroundings.

Policy 2.31 Commitment to a Walkable City
The City and county will promote the development of a walkable city by designing neighborhoods and business areas to provide easy and safe access by foot to places such as neighborhood centers, community facilities, transit stops or centers, and shared public spaces and amenities.

Policy 2.32 Trail Corridors / Linkages
In the process of considering development proposals, the City and county will encourage the development of trails and trail linkages for appropriate uses such as hiking, bicycling or horseback riding, so as to provide a variety of alternative recreation and transportation opportunities. Implementation of this goal will be achieved through the coordinated efforts of the private and public sectors.

Policy 3.10 Utility Provision to Implement Community Goals
The City will consider the importance of the other objectives of the comprehensive plan in the planning and operation of the water, wastewater, stormwater and flood management utilities. These other objectives include in-stream flow maintenance, enhancement of recreational opportunities, water quality management, preservation of natural ecosystems, open space and irrigated agricultural land, and implementation of desired timing and location of growth patterns.

Policy 3.13 Trail Functions and Locations
Trails serve a variety of functions such as recreation, transportation, education and/or environmental protection. Trails should be designed and managed to minimize conflicts among trail users. Trailheads should be located so they are convenient and safe for those arriving by alternate modes of transportation as well as automobiles. In order to provide environmental protection, informal trails and user widening of trails should be discouraged by ensuring that formal trails are well designed, monitored and adequately maintained. Trail and trailhead locations and alignments should avoid environmentally sensitive areas and minimize environmental impacts.

Policy 3.14 Trails Network
The City and county will coordinate with other trail providers and private landowners in trail system planning, construction, management and maintenance. Where compatible with environmental protection goals and conservation easement agreements, trail connections will be developed to enhance the overall functioning of the trails network.

Policy 4.06 Natural Ecosystems
The City and county will protect and restore significant native ecosystems on public and private lands through land use planning, development review, conservation easements, acquisition, and public land management practices. The protection and enhancement of biological diversity and habitat for federal endangered and threatened species and state, county and local species of concern will be emphasized. Degraded habitat may be restored and selected extirpated species may be reintroduced as a means of enhancing native flora and fauna in the Boulder Valley.

Policy 4.07 Ecosystem Connections and Buffers
The City and county recognize the biological importance of preserving large areas of unfragmented habitat. The City and county will work together to preserve, enhance, restore and maintain undeveloped lands critical for providing ecosystem connections and buffers for joining significant ecosystems. These areas are important for sustaining biological diversity and viable habitats for native species and for minimizing impacts from developed lands.

Policy 4.08 Maintain and Restore Ecological Processes
Recognizing that ecological change is an integral part of the functioning of natural systems, the City and county will work to ensure that, when appropriate precautions have been taken for human safety and welfare, natural processes will be utilized or mimicked to sustain, protect and enhance ecosystems.

Policy 4.10 Invasive Species Management
The City and county will promote efforts, both public and private, that prevent the introduction or culture of invasive plant and animal species and seek to control their spread. High priority will be given to managing invasive species that have, or potentially could have, a substantial impact on city and county resources, or that can reasonably be expected to be successfully controlled.

Policy 4.20 Preservation of Floodplains
Undeveloped floodplains will be preserved or restored where possible through public land acquisition of high hazard properties, private land dedication and multiple program coordination. Comprehensive planning and management of floodplain lands will promote the preservation of natural and beneficial functions of floodplains whenever possible.

Policy 4.21 Flood Management
The City will protect the public and property from the devastating impacts of flooding in a timely and cost-effective manner while balancing community interests with public safety needs. The City will manage the potential for floods by implementing the following guiding principles:

a) Preserve floodplains
b) Be prepared for floods
c) Help people protect themselves from flood hazards
d) Prevent unwise uses and adverse impacts in the floodplain
e) Seek to accommodate floods, not control them

Policy 4.22 Non-Structural Approach
The City will seek to preserve the natural and beneficial functions of floodplains by emphasizing and balancing the use of non-structural measures with structural mitigation. Where drainage way improvements are proposed, a non-structural approach should be applied wherever possible to preserve the natural values of local waterways while balancing private property interests and associated cost to the City.

Policy 4.23 Protection of High Hazard Areas
The City will prevent redevelopment of significantly flood-damaged properties in high hazard areas. The City will prepare a plan for property acquisition of flood-damaged and undeveloped land in high hazard flood areas. Undeveloped high hazard flood areas will be retained in their natural state whenever possible. Compatible uses of riparian corridors, such as natural ecosystems, wildlife habitat and wetlands will be encouraged wherever appropriate. Trails or other open recreational facilities may be feasible in certain areas.

Policy 6.03 System Completion
The City and county will strive to make bicycling, walking and transit convenient and safe by completing the systems for these modes and providing seamless connections between the systems developed in the city and county. The City will provide a combination of on-street and off-street bicycle and pedestrian facilities to accommodate a variety of user types and to provide users with a choice of the type of environment in which to walk or bike. The City will seek to cooperate with RTD to incrementally increase the community- based, high-frequency transit system in the designated multimodal corridors.

The Greenways Program incorporates Boulder Valley Comprehensive Plan policies by providing, among other things, flood control measures, water quality enhancement, riparian corridors, trails, recreation opportunities, wildlife habitat and wetlands.

**Subcommunity and Area Plans**

Boulder's service area has been divided into nine subcommunities. The goal of subcommunity planning is to address multiple planning issues on an area-wide level, including transportation, land use, zoning, recreation and open land availability. Subcommunity plans address Greenways Program objectives related to recreation needs, environmental protection, bicycle and pedestrian connections, and subcommunity identity and character.

A plan for the North Boulder subcommunity was adopted by the City Council in August, 1995. This plan outlines a framework and implementation strategies for the Greenways Program within that subcommunity. The Greenways Master Plan map and update have been reviewed for consistency with the North Boulder Subcommunity Plan.

The North Boulder Subcommunity Plan includes specific goals, objectives and action plans that are relevant to the Greenways Program. Among these are recommendations for channel, wetland, habitat, and water quality protection, restoration and enhancement along segments of Fourmile Canyon Creek and Wonderland Creek. The action plan for achieving these goals includes wetland mitigation, Greenways improvements, and site acquisition. In addition, one of the primary concepts of the subcommunity plan is to provide improved bicycle and pedestrian facilities by connecting the existing pedestrian and bicycle network along and near Fourmile Canyon Creek.

The city also prepares Area Plans for smaller areas that address Greenways Program objectives. The Transit Village Area Plan, for example, was adopted in 2007 and includes specific recommendations for the Goose Creek Greenway.

**Comprehensive Flood and Stormwater Utility Master Plan**

The Public Works Department manages the stormwater and flood management system for the city. A stormwater and flood management utility was created in 1973. The purpose and function of the utility is to minimize the threat of flooding and flood damage resulting from stormwater runoff. Currently, the utility contributes $150,000 per year to the Greenways Program. Flood Utility funds are administered by the Public Works Department and can be used for improvements providing or maintaining flood safety along streams, conveyance facilities including box culverts, water quality enhancements and habitat improvements. The 2004 Comprehensive Flood and Stormwater Utility Master Plan (CFS) outlines the long-term program for flood management in terms of capital improvements, flood hazard mitigation, storm and surface water quality, and other utility efforts such as flood warning and education, protection and enhancement of wetlands, and property acquisition. The CFS recommended expansion of the Greenways Master Plan principals to all tributaries beyond Boulder Creek and the six tributaries included in the 2001 plan. The CFS also recommends using a balanced approach to drainage solutions that provide multiple benefits, including the water quality / quantity benefits of preserving the stream corridor and its natural character.

**Flood Mitigation Plans**

The city is a member of the regional Urban Drainage and Flood Control District (UDFCD) which was established by the Colorado legislature in 1969 for the purpose of assisting local governments in the Denver metropolitan area with multi-jurisdictional drainage and flood control problems. The District operates five programs: Master Planning, Design and Construction, Maintenance, Floodplain Management, and the South Platte River. Funding for these programs is derived from levies of 0.756 mil rate in Adams, Arapahoe, Denver, Douglas and Jefferson Counties, and 0.676 mil rate in Boulder County. (Boulder County is not levied the 0.1 mil rate earmarked specifically for the South Platte River Program.) The four programs relevant to the City of Boulder are described below.

The Floodplain Management program was established to prevent new flood damage potential from being introduced into the 100-year floodplains while encouraging the use of non-structural methods of flood damage mitigation. The District works with local governments to assure that they remain in the National Flood Insurance Program; assists local governments with floodplain regulations; delineates flood hazard areas; and assists local governments in the development of flood warning plans and the installation and maintenance of flood detection networks. The District funds a private meteorological service to provide daily forecasts of flood-producing events to local governments. It requires that drainage and flood control facilities be approved by the District for those facilities to be eligible for assistance from the District's Maintenance Program. Eligibility for maintenance assistance is determined by Floodplain Management Program staff.

The District's Master Planning Program provides up to 50 percent of study costs for flood mitigation master planning efforts. The five major concentrations in the Master Planning Program are major drainage way master planning; outfall systems planning; drainage criteria; support of local government stormwater NPDES discharge permitting efforts; and special projects such as maintenance related channel and structure repairs. A master plan was recently completed and accepted by City Council in 2009 for Fourmile Canyon Creek and Wonderland Creek. The city is currently working on a master plan for South Boulder Creek with anticipated completion in 2012.

**Transportation Master Plan**

The Transportation Master Plan pursues two goals. The first goal is to provide mobility and access within the city in a way that is safe and convenient. The second goal is to preserve Boulder's quality of life by minimizing the impacts from auto traffic such as air pollution, congestion, and noise.

The Transportation Master Plan balances these goals by creating a transportation system that provides not only good auto transportation, but also alternative forms of transportation such as walking, bicycling, and transit. The Plan proposes strategies to maintain and improve the auto system while at the same time creating new opportunities for other modes by completing the bicycle and sidewalk system and providing new types of transit options. The Plan also provides a funding mechanism to maintain and complete the auto, bicycle, and pedestrian systems.

The Transportation Master Plan includes a list of objectives that describe the desired future condition of Boulder's transportation system. The Plan was updated in 2003 and is based on trends and projections to the year 2025. The 2008 update of the Transportation Master Plan states goals for 2025 as:

- Continued progress toward no growth in long-term vehicle traffic
- Reduce single-occupant vehicle travel to 25 percent of trips
- Continued reduction in mobile source emissions of air pollutants
- No more than 20 percent of roadways congested
- Expand fiscally viable transportation alternatives for all Boulder residents and employees, including the elderly and those with disabilities
- Increase transportation alternatives commensurate with the rate of employee growth

Implementation of the Greenways Plan will forward the Transportation Master Plan's goals by providing trail systems that facilitate non-vehicular means of transportation within the city.

The Transportation budget currently contributes $150,000 per year to the Greenways Program. Transportation funds are administered by the Public Works Department and may be used to construct trails (usually paved) and related facilities which provide a substantial transportation benefit to a relatively large number of users.

**Water Quality Strategic Plan**

In June, 2009, the city prepared a Water Quality Strategic Plan. The purpose of the five-year plan is to develop water quality goals, strategies and performance measures to achieve these goals, and provide a process to address current and future water quality challenges. Water quality goals were developed using an inventory of existing water quality goal statements found in the city's master plans, policies, and regulations, starting with the BVCP. From this exercise, the following five goal statements were developed:

1. Provide safe and high quality drinking water
2. Manage pollutants from wastewater and other point-sources
3. Manage pollutants from stormwater and other non-point sources
4. Protect, preserve and restore natural water systems
5. Conserve water resources

The Greenways Program compliments goals three and four of the Water Quality Strategic Plan.

**Parks and Recreation Master Plan**

A primary mission of the Parks and Recreation Department is to provide park amenities and recreation services as well as various program opportunities to serve the needs of the residents of the City of Boulder. The basic fabric of the parks and recreation system is the neighborhood and community parks. Other components of the city's park and recreation system include regional parks, park corridors, preserves, athletic complexes, recreation centers and various special use facilities.

The 2006 Parks and Recreation Master Plan recognizes the community need for more undeveloped open land or natural parks within the city for quiet, passive recreation. Among the various goals for the future, the Parks and Recreation Master Plan envisions a system of safe and

scenic paths and trails connecting all parks and facilities and recommends cooperation with the Greenways Program to expand and complete the urban trails system linking parks. The Greenways Program complements the objectives of the Parks and Recreation program by providing passive recreation areas along tributary drainages, protecting and reclaiming open areas along the included drainage ways, linking parks and recreational facilities within the city, and providing a trail system for rollerblading, bicycling, running and other recreational activities.

The Parks and Recreation Department administers State Lottery funds. The Greenways Program currently receives $150,000 per year from the Lottery fund. Lottery funds may be used for trail and related facility construction, environmental rehabilitation projects, and passive recreational improvements. **Table 2-1** lists the park sites along Greenways by reach.

**Table 2-1 List of Park Sites along Greenways by Reach**

**Bear Canyon Creek**
- Bear Creek Park (BCC6)
- Martin Park (BCC4)
- Park East Park (BCC2)
- Mesa Memorial Park (BCC5)
- Reynolds Library (BCC5)

**Bluebell Creek**
- Chautauqua Park (BLC2)

**Boulder Creek**
- Eben G. Fine Park (BC7)
- Kids Fishing Pond (BC7)
- Municipal Campus (BC7)
- Central Park (BC7)
- Mary Wolffe Park (BC6)
- Scott Carpenter Park (BC5)
- Bike Path at 28th St. (BC5)
- Bike Path at Folsom (BC6/BC5)
- Watts Hardy (BC6)
- Swoboda memorial (BC6)
- Pizza Park parcels (BC7)
- West Boulder Creek Corridor (BC7)
- Haertling Sculpture Garden (BC7)

**Dry Creek #2**
- Flatirons Golf Course (DC2)

**Elmer's Two Mile Creek**
- Elmer's Two Mile Park (ETC1)
- Park side Park (ETC1)

**Goose Creek**
- East Mapleton Ballfield Complex (GC4)

**Fourmile Canyon Creek**
- Foothills Community Park (FC 5)
- Violet Park (FC4)
- Elks Park Site (FC3)
- East Palo Park (FC2)
- Central-South Palo Park (FC2)
- Pleasant View Soccer Fields (FC1)

**Gregory Creek**
- Smith Park (GRC2)
- Columbia Cemetery (GRC1)

**Skunk Creek**
- Arrow Wood Park (SC3)

**South Boulder Creek**
- East Boulder Community Center (SBC4)
- Keewayden Meadows Park (SBC4)
- Stazio Ballfield (SBC1, SBC2)

**Sunshine Creek**
- Knollwood Park (SNC1)

**Viele Channel**
- Harlow Platts Community Park
- Tantra Park
- Tantra Environmental Park

**Wonderland Creek**
- Howard Heuston Park (WC3)
- Christensen Park (WC2)
- Valmont City Park (WC1, GC1)

**Open Space and Mountain Parks Management Policies**

The Open Space and Mountain Parks Department operates in accordance with Open Space Charter provisions and missions, among which are to preserve and restore natural areas with associated unusual, spectacular, historically important, scientifically valuable or rare examples of native flora and fauna; preserve water resources in their natural or traditional state, including wildlife habitats or fragile ecosystems; promote use of program lands for passive recreational use; preserve agricultural land uses and land suitable for agricultural production; and use of lands to prevent encroachment on floodplains.

The Open Space Program has greatly contributed to the preservation of native ecosystems and to the use of land for shaping the development of the city. The Greenways Program complements the Open Space Program by identifying additional strategies for preserving riparian wildlife habitat and natural ecosystems within the city, providing additional passive recreation opportunities and areas, and linking the city's open areas.

The Open Space and Mountain Parks Department follows Long Range Management Policies to define program goals, decision-making process and implementation techniques within a 20-year planning horizon. Long Range Management Policies are updated every five years. In addition to the Long Range Management Policies, resource plans and area management plans are developed to further guide management of Open Space lands. Resource plans provide system wide management guidance for various resources and are integrated into specific on-the-ground actions contained within area management plans. The goals of area management planning are to provide guidance and direction for management of specific areas of Open Space; develop a framework for evaluating and incorporating appropriate uses of Open Space according to the Open Space Charter; prepare inventories and analyses of resources; provide opportunities for public participation; and to coordinate resource management, protection and planning with other city departments and public and private landowners.

The OSMP Department prepared a Grassland Ecosystem Management Plan that was accepted by City Council in May 2010. The Grassland Plan focuses on the conservation of the 24,000 acres of OSMP lands dominated by mixedgrass and xeric tallgrass prairie. The Grassland Plan is intended to provide a framework for on-the-ground management actions, public policies and land and water acquisition priorities to conserve the ecological values of Boulder's grasslands and ensure on-going agricultural production. Plan objectives and strategies are organized into four strategic initiatives for taking conservation action and two initiatives to support conservation action:

- Initiative 1: Large Block Habitat Effectiveness
- Initiative 2: Grassland Restoration
- Initiative 3: Aquatic Systems Management
- Initiative 4: Agro-Ecosystems
- Initiative 5: Monitoring
- Initiative 6: Capacity Building

Greenways projects proposed within the grasslands management planning area will need to align with the initiatives presented in the Grassland Plan.

**Table 2-2** lists the Open Space property along Greenways by reach.

**Table 2-2 List of Open Space Managed Properties along Greenways by Reach**

**Bear Canyon Creek**
- Southern Hills United Church (BCC6)
- Hatch-Quinby-Phipps (BCC1)
- Wells (BCC6)
- US Patent – Bear Peak (BCC6)

**Bluebell Creek**
- Batchelder (BLC2)

**Boulder Creek**
- Folsom-Boulder Creek Trail (BC5)
- East Park #2 (BC3)
- Sandy Arnold (BC3)
- William Arnold (BC2)
- Cottonwood Grove (BC2)
- Pearl Street Industrial Park (BC2)
- Colorado Open Land II-Sec 28 (BC2)
- Colorado Open Land II-Sec 27 (BC1)
- Union Pacific Railroad (BC1)
- Colorado Open Land III-Sec 22 (BC1)
- Straty/Cline – Open Space (BC1)
- Lakecenter, Ltd. I (NE) (BC1)
- Colorado Open Land I – Sec 22 (BC1)
- Straty/Cline CE (BC1)
- Cottonwood Farms – East (BC1)
- Sawhill Ponds (BC1)
- Arapahoe Chemicals (BC2)
- BC Hospital (BC2)
- Syntex Chemicals (BC2)
- Kassler (BC7)
- Thorne I (BC7)
- Thorne II (BC7)
- Thorne III (BC7)
- Posphala (BC7)
- US Patent-Green Mountain (BC8)
- Kraft (BC8)
- Short and Milne (BC1)

**Fourmile Canyon Creek**
- Belgrove (FC1)
- Mary Moore I (FC 5)
- Palo Park Trail East (FC2)
- Palo Park Trail West (FC2)
- Elmgrove (FC1)
- McKenzie (FC1)
- Parsons (FC5)
- ERNI – North (FC5)
- Pinebrook Water District (FC5)

**Gregory Creek**
- Austin-Russell (GRC2)
- Martin – CE (GRC2)
- Dean, Mattie (GRC1)

**Kings Gulch**
- Tippitt (KG1)
- Enchanted Mesa Condemnation (KG1)

**Skunk Creek**
- N.I.S.T. (SC5)
- NCAR Park (SC6)

**South Boulder Creek**
- Burke I (SBC4)
- Gebhard (SBC4)
- Burke II (SBC3)
- Flatirons Industrial Park (SBC2)
- Copper Door (SBC2)
- Valmont industrial Park (SBC1)
- Colorado Open Land III- KOA Lake (SBC1)
- Boulder Conservative Synagogue (SBC3)
- Vanvleet (SBC4)
- Fancher (SBC5)
- Neuhauser (SBC6)

**Sunshine Creek**
- Boulder Memorial Hospital (SNC1)
- Public Service Co (SNC1)
- Community Hospital (SNC1)

**Two Mile Canyon Creek**
- Spring Valley – West (TMC1)
- Spring Valley – East (TMC1)

**Viele Channel**
- Van Vleet (VC1)
- Mary Clinke-East (VC1)
- Mary Clinke-Utilities Easement, East (VC1)

**Wonderland Creek**
- Anna Dunn (WC8)
- Noble Park (WC2)
- Plum Creek - North (WC2)
- Parkside (WC1)
- Center Green Heights – south (WC2)
- Markel I – Norwood Pl (WC5)
- Riverside Avenue – Moore's Subdivision (WC6)
- Wonderland Hill Development Corp (WC8)

## 2.2 Permits and Codes

**Wetlands Permitting**

Greenways projects are subject to two wetlands permitting processes. Section 404 of the Clean Water Act (33 U.S.C. 1344) prohibits the discharge of dredged or fill material into waters of the United States without a permit from the U.S. Army Corps of Engineers. Section 404 permitting requirements apply to all waters of the United States, including adjacent wetlands and tributaries to navigable waters of the United States. All projects which modify drainage channels and/or otherwise affect adjacent streamside vegetation generally require this type of permit. Most Greenways projects can be addressed through Corps of Engineers "nationwide permits," which authorize broad categories of projects such as maintenance, utility line backfill and bedding, etc. In applying for this type of permit, the city must describe its proposed project; describe project impacts, including effects to wetlands; and outline measures to be taken to avoid or reduce adverse effects to wetlands and to ensure full rehabilitation of disturbance following project completion. Where permanent loss of wetlands is unavoidable, restoration of nearby wetlands which have been damaged or degraded at a rate exceeding the area of permanent loss is generally required.

The City of Boulder adopted a revised Stream, Wetland and Water Body Protection Ordinance in 2009. This ordinance (BRC Title 9, Section 9-3-9) preserves, protects and enhances streams, wetlands and water bodies by discouraging development activities in wetlands and adjacent areas. The ordinance establishes a goal of no-net-loss of wetland acreage and function by regulating activities in and around wetlands. These rules apply to all wetlands mapped within Boulder's city limits, as well as all wetlands on city-owned land, and all city activities affecting wetlands regardless of location.

City wetlands permits are required for Greenways projects that affect wetlands and associated buffer zones surrounding wetlands along the designated tributary drainages. Streams, wetlands, water bodies and surrounding inner and outer buffer zones are referred to as "regulated areas." Streams, wetlands, and water bodies are designated as either high or low functioning. The buffer area width for high functioning steams, wetlands, and water bodies is 50 feet and includes a 25-foot inner and 25-foot outer buffer zone. The buffer area width for low functioning streams, wetlands, and water bodies is 25 feet and is considered an outer buffer area.

The ordinance establishes permitted, allowed, and prohibited uses within the regulated area including buffer areas. Maintenance activities, removal of debris, weed management, and minor vegetation removal are exempt from requiring a permit. Maintenance activities are defined as any activity undertaken to repair or prevent the deterioration, impairment, or failure of any previously constructed improvement or structure including, without limitation, the replacement of structural components. Maintenance also includes the addition of material to reinforce or protect the integrity of an existing public facility. Maintenance does not include reconstruction that materially enlarges or expands a facility or total replacement of an existing structure.

Permitted activities require either a conditional use permit or standard permit as defined in the ordinance. Wetlands permit applications contain a description of the proposed activity; a discussion of why avoidance and less damaging alternatives have been rejected by the applicant;

a site plan; locations and specifications for all proposed regulated activities and the associated impacts; and descriptions and statements concerning proposed fill materials. The City of Boulder Public Works Department Floodplain and Wetlands Administrator reviews wetlands permit applications and may refer them to the Planning Board. The Planning Board may call up standard wetlands permit applications within 14 days of the approval, and the City Council may call up Planning Board recommendations.

In order to obtain city wetlands permits, projects must minimize adverse impacts to a wetland and its functions and must not jeopardize the continued existence of habitat for plants, animals or other wildlife species listed by the federal government, State of Colorado, or in the Boulder County Comprehensive Plan as threatened, endangered, rare, special concern, of undetermined status, or critical. In addition, the project's public benefits are considered in comparison to anticipated wetland impacts. The permit may be conditioned to require a mitigation plan. A mitigation plan requires the applicant to engage in the enhancement, restoration or creation of a stream, wetland or water body in order to offset, in whole or in part, the losses or impacts resulting from the applicant's actions. Enhancement, restoration, or creation of wetlands greater than a 1:1 ratio will likely require transfer or purchase of water rights to compensate for water loss as required by the State of Colorado.

**Floodplain Development Regulations**

Boulder's location at the mouth of a canyon watershed gives it the distinction of the city with the highest flash flood risk in Colorado. The City has developed zoning and land use programs, in addition to the construction of improved drainage ways, diversions, and other structures to help prepare the city to deal with flooding more effectively.

Title 11 - Chapter 5 of the Boulder Revised Code (BRC), establishes the development requirements related to storm water within the City of Boulder. The City Manager is charged with the development of a master drainage plan for the City to include all completed or proposed drainage facilities required to carry surface waters without overflow or discharge, as well as all drainage ways and basins that directly or indirectly affect drainage within the city. A comprehensive stormwater master plan was completed in 2006. BRC 11-5-4 requires that all development of land within the city must ensure adequate drainage and management of storm waters and floods falling on or flowing onto the property.

Title 9 - Chapter 9 of the BRC establishes the land use regulations that apply to the floodplains, conveyance zones and high hazard zones associated with drainage ways within the city. A Floodplain Development Permit is required for all development in the floodplain, including Greenways improvement projects. Greenways projects require a floodplain development permit because they involve construction of facilities within the floodplains of the drainages included in the program. The permit application requires a detailed stormwater and flood management plan and design features must comply with the city's Design and Construction Standards and cause no adverse downstream impacts. The Floodplain Development Permit is reviewed by the City of Boulder Public Works Department Floodplain and Wetlands Administrator. Floodplain Development Permit applications for the conveyance and high hazard zones are referred to the Planning Board as a potential call-up. The Planning Board may call up the staff approval within

14 days of the approval. If called up, the Planning Board reviews the application, holds a public hearing, and reaches a decision concerning the development.

In addition, all new development other than single family homes are required to have onsite detention storage design in accordance with the city's Design and Construction Standards. In order to obtain a building permit for parcels of land through which a natural drainage way flows, the owner must grant the city, at no charge, a permanent easement to construct, maintain, or reconstruct the channel along the drainage way and provide a financial guarantee for the construction of drainage facilities shown in the approved flood mitigation master plan. The City of Boulder Public Works Planning and Development Services group evaluates proposed developments for compliance with the Design and Construction Standards, master plans, policies, and other pertinent regulations. Easements acquired during development or annexation will help to forward the Greenways Program goals of flood mitigation and alternative transportation routes for pedestrians and bicyclists (trail construction).

# 3 Implementation

This chapter presents program objectives and goals, project and program opportunities based on these goals, and the method required to implement Greenways projects.

## *3.1 Opportunity Objectives and Goals*

Program goals were developed by the interdisciplinary staff work group based upon the goals, objectives and policies from related master planning efforts, current federal, state and local regulations, standards and criteria, and public comment obtained through a series of public meetings convened in the course of the 2001 Master Plan update. The objectives and goals for the Greenways Program are summarized in **Table 3-1**.

**Table 3-1: Objectives and Goals of the Greenways Program**

| Program Focus | Objectives and Goals |
|---|---|
| **Habitat – Riparian, Flood Plain & Wetland Protection and Restoration** | • Protect and enhance areas with high habitat value<br>• Restore habitat for native species<br>• Protect areas for species of concern<br>• Protect and restore high quality wetlands |
| **Water Quality Enhancement** | • Preserve and enhance ecologically important areas<br>• Maintain and enhance stream channel stability<br>• Preserve and enhance stream corridor water quality function<br>• Strive to meet all current State of Colorado stream use classification criteria |
| **Storm Drainage & Flood Mitigation** | • Mitigate flood hazards and reduce the potential for property damage and loss of life<br>• Minimize routine storm drainage problems<br>• Maintain existing drainage way facilities<br>• Manage water resources to provide appropriate in-stream flows and protect water quality and riparian habitat |
| **Alternative Transportation Routes for Pedestrians and Bicyclists** | • Provide a high degree of mobility for pedestrians and bicyclists<br>o Continuous, well-connected, off-road<br>o Beautiful, safe, asset to community<br>o Minimize environmental impact<br>o Provide adequate signing and connections to road system<br>o Grade separated<br>o Maintain year round<br>o Priority given to provide access to public facilities and major activity centers |
| **Recreation Opportunities** | • Promote physical and mental health and fitness<br>• Nourish the development of children and youth<br>• Help build strong communities and neighborhoods<br>• Promote environmental stewardship<br>• Provide beautiful, safe and functional facilities |
| **Protection of Cultural Resources** | • Protect historic resources<br>• Preserve and promote archeological resources<br>• Promote public understanding and appreciation of historic and archeological sites |
| **Cost Effectiveness** | • Construct the Greenways system in a cost effective manner<br>• Take advantage of unique opportunities<br>• Take advantage of partnerships and multi-purpose projects |

The following provides a more detailed description of each of the Greenways Program goals.

**Terrestrial and Aquatic Habitat Goals**

***1. Protect and enhance areas with high habitat value.*** Areas of high habitat value include those areas with high habitat values (e.g. bird species richness, native plant and wildlife value, and vegetation structure). Riparian areas meeting these criteria will be protected from degradation and enhanced when possible.

***2. Restore habitat for native species.*** Restoration projects are to be identified for areas that are degraded, having low habitat ranking scores. Projects should be selected based on restoration potential and minimal conflicts with adjacent land uses.

***3. Protect areas for species of concern.*** Areas that currently contain species of concern are to be protected. Potential habitat for species of concern with good restoration potential should be restored and protected from future degradation.

***4. Protect and restore high quality wetlands.*** All wetlands categorized as high functional under the city's wetland ordinance are to be protected from degradation. High functional wetlands include those categorized under criteria set forth in the Boulder County Comprehensive Master Plan; perform at least one wetland function to a high or very high degree; provide habitat for threatened, endangered or special concern species; can be made significant through reasonable changes in management practices; and/or have a hydrological connection to a wetland and which, if impaired, would result in adverse impacts. In addition, effort should be made to protect the buffer zones surrounding these wetlands.

***Criteria for Evaluating Program Success at Achieving Goals:***

The following criteria can be used to evaluate a proposed Greenways project's ability to achieve the terrestrial habitat goals:

- Acres of very good bird habitat affected
- Acres of very good native plant habitat affected
- Acres of very good vegetation structure affected
- Acres of enhanced or restored bird habitat
- Acres of enhanced or restored native plant habitat
- Acres of enhanced or restored vegetation structure
- Acres of habitat for special concern species affected
- Acres of potential habitat for special concern species enhanced or restored
- Acres of wetlands temporarily/permanently affected
- Acres of wetlands enhanced or restored

**Water Quality Goals**

***1. Preserve and enhance ecologically important areas.*** The city will maintain or improve aquatic habitat conditions.

***2. Maintain and enhance stream bank stability.*** Stream bank erosion will be minimized through preservation and enhancement stream bank vegetation.

***3. Preserve and enhance stream corridor water quality function.*** Stream water quality functions will be improved through the preservation of groundwater/ surface water interaction and recharge function, and through maintaining and enhancing wetlands and riparian areas habitat values

***4. Strive to meet recreational stream standards.*** To maintain water quality suitable for recreation uses such as fishing, wading and boating private and public maintenance practices along riparian corridors should minimize use of landscape chemicals, control human and animal waste, and control runoff.

***Criteria for Evaluating Program Success at Achieving Goals:***

The following criteria can be used to evaluate a proposed Greenways project's ability to achieve the water quality goals:

- Linear feet of preserved high quality aquatic habitat
- Linear feet of improved primary, secondary and tertiary aquatic habitat
- Linear feet of stream banks improved to "good" or better vegetation stability ranking
- Acres of created, restored or enhanced wetlands
- Achievement of stream recreation designated use standard
- Reduction in use of pesticides and fertilizers along riparian areas
- Consistent compliance with pet waste disposal regulations

**Drainage, Flood Management and Water Resources Goals**

***1. Mitigate flood hazards and reduce the potential for property damage and loss of life.*** The city will continue to regulate new uses and developments within the 100-year floodplain. In developed urban areas, where practical and desirable, the city attempts to eliminate existing uses and construction within the 100-year flood plain, flood conveyance zone or high hazard zone that are inconsistent with the regulations. The city has funds to purchase from willing sellers properties located in the high hazard flood zone. A draft ordinance was developed in 2010 that would require critical facilities located in the 500-year floodplain to floodproof and have a management plan for the facility.

***2. Minimize routine storm drainage problems by providing adequate facilities along major drainageways.*** The city makes every effort to design and construct drainageway facilities that are aesthetically pleasing, beneficial to wildlife habitat, result in minimal damage to development and public infrastructure, controls erosion and enhances water quality.

***3. Maintain existing drainageway facilities.*** The city makes every attempt to design drainageway improvements that reduce the expense and impacts associated with on-going maintenance, provide adequate drainage way easements and access for on-going maintenance,

and maintain flood flow design capacity. Projects will mitigate for any temporary or permanent impacts to wetland and wildlife habitat.

***4. Manage water resources to provide appropriate base flows and protect water quality and riparian habitat.*** The city has as a goal to eliminate irrigation ditch crossings with major drainageways to eliminate the potential for damage to development and public infrastructure along the irrigation ditches and to secure a base flow in the major drainageways.

***Criteria for Evaluating Program Success at Achieving Goals:***
The following criteria can be used to evaluate a proposed Greenways project's ability to achieve the drainage, flood management and water resource goals:

- Reduction in the number of structures subject to impact due to location within the 100-year flood plain
- Reduction in the number of structures subject to impact due to location within the high hazard zone
- Reduction in area (acres) encompassed by the 100-year flood plain
- Number of drainage/irrigation ditch crossings eliminated

**Recreation Goals**

***1. Promote optimum physical and mental health and fitness in a balanced lifestyle which prepares people for full and productive participation in family, work, social and community life.*** Provide, coordinate and/or facilitate varied opportunities within Greenways areas for a broad spectrum of recreation including individual and team sports, indoor and outdoor programs, and organized and unorganized activities. Activities near Greenways areas will support workplace productivity and morale and will address the social, emotional, creative and spiritual needs of users.

***2. Nourish the emotional, physical and social development of children and youth.*** Provide, coordinate and facilitate services near Greenways that address the specific needs of children, youth and their families; coordinate and facilitate opportunities for safe, constructive and challenging use of leisure time; enhance opportunities for leadership development; and promote the development of lifetime leisure skills.

***3. Help build a strong sense of community and neighborhood identity and develop understanding and harmony among community users.*** The city must provide public gathering places and focal points within and near the Greenways corridors; sponsor and support community-wide, neighborhood, and special interest events within and along the Greenways; provide equity in access to Greenways for all residents; provide programs that bring diverse individuals together in a spirit of mutual learning and cooperation; and promote volunteerism and volunteer training opportunities for development, use and maintenance of the Greenways.

***4. Act as stewards in preserving and restoring the health of the natural environment.*** The city will protect and expand the urban forest environment. It is necessary to maintain a balance between serving public needs for recreational programs and facilities and protecting the natural environment.

***5. Provide places of function and beauty that refresh the spirit and increase life satisfaction.*** The city will balance ease of maintenance, functionality, and aesthetic appeal for both users of services and those passing through park and recreation lands through the design and landscaping of parks. The city will provide opportunities for tranquil reflection on the complexity and beauty of nature, while maintaining park and recreation facilities along the Greenways in excellent condition and managing them so they do not exceed design or carrying capacities. Measures will be taken to enhance visitor and employee safety and reduce vandalism and other criminal activity in park and recreational facilities along the Greenways corridors.

***Criteria for Evaluating Program Success at Achieving Goals:***
The following criteria can be used to evaluate a proposed Greenways project's ability to achieve the recreation goals:

- Number and type of recreational uses supported by proposed Greenways project
- Number and type of recreational uses specifically for children and youth supported by proposed Greenways project
- Number and type of neighborhood and community events anticipated in proposed Greenways project area
- Access limitations
- Type/description of volunteer opportunities provided by proposed project
- Number of complaints/complements received from recreational users of stream reach
- Number of accidents/injuries/required repairs by stream reach

**Transportation Goals**

***1. Provide a system of continuous, well-connected, off-road routes for pedestrians, bicyclists and other users.*** Work to eliminate breaks and discontinuities in the sidewalk system, upgrade existing pedestrian facilities cooperatively with land owners, inventory and evaluate multi-use paths, and ensure adequate connections of the pedestrian system to public transit. In addition, primary and secondary bicycle corridors will be identified with the goal of providing continuous facilities within these corridors. Corridors will be coordinated with other entities and jurisdictions. The Bicycle System Plan, a component of the Transportation Master Plan, outlines the importance of secure bicycle parking as a factor in determining bicycle mode share. It is recommended that future Greenways projects evaluate and, if appropriate, install adequate and secure bicycle parking at destination areas.

***2. Construct facilities that are beautiful, safe and an asset to the surrounding community.***

***3. Construct and maintain Greenways paths in a way that minimizes negative environmental impact while still maintaining the transportation function.***

***4. Provide adequate signing and connections to the road system to integrate the Greenways trails with the overall transportation system (including Parks and OSMP trail system as appropriate).***

***5. Construct the Greenways paths to be grade separated to provide safety and comfort to all levels of users, especially children and novice riders that are not equipped to ride on the roadway system.***

***6. Maintain Greenways paths year-round to support their function as a transportation facility and to meet the expectations of users.***

***7. Prioritize construction of Greenways segments to provide access to public facilities and major activities centers.***

***Criteria for Evaluating Program Success at Achieving Goals:***
The following criteria can be used to evaluate a proposed Greenways project's ability to achieve the transportation goals:

- Length of path built within any stream reach
- Number of users
- Number of reported accidents and crimes within any stream reach
- Number of adjacent property owner complaints/compliments
- Length of path built that provides off-road, safe connection to a school
- Number of snow, ice, etc. maintenance complaints received for each stream reach
- Public facilities/major activities centers connections for each project
- Number of Greenways projects incorporating multiple purposes and sources of funding

**Cultural Resources Goals**

***1. Protect Historic Resources.*** Significant cultural properties should be actively preserved and maintained, whether or not they have been listed on the NRHP or designated as a City Landmark. Cultural properties that are owned by the city, such as Eben G. Fine and Central Parks, should have preservation of their historical integrity as a priority. While ditches and railroads have their own legally protected rights-of-way, the owners should be encouraged to maintain the properties in their historical condition whenever possible. The Boulder Valley School District and the University of Colorado should be encouraged to maintain significant historic resources on their properties which intersect the Greenways system.

***2. Preserve and Promote Archaeological Resources.*** Prehistoric and historic archaeological sites within the Greenways system are rare due to obliteration by flooding and historic disturbance associated with development of the area. Archaeological sites such as the Boyd Smelter and City Dump at Scott Carpenter Park should be protected from looting. Any future earth disturbing activities near these sites should be monitored by a professional archaeologist to ensure that archaeological site components are not destroyed.

***3. Promote public understanding and appreciation of historic and archaeological sites.***
Interpretive signs and/or brochures discussing specific cultural resources and general historical data can be useful and informative to the public. Interpretive signs can be placed anywhere a cultural property is encountered along a Greenway. The most appropriate location for historical interpretation is along Boulder Creek, Reach 7, from Eben G. Fine Park to 9$^{th}$ Street, or to Broadway. While some of the history of this area cannot be illustrated by physical remains or structures, it can be readily demonstrated with historic photos. This should be done in a manner to provide continuity with the interpretive signs installed by Boulder County for the Pioneer Trail, which extends west up Boulder Canyon from Eben G. Fine Park.

***Criteria for Evaluating Program Success at Achieving Goals:***
The following criteria can be used to evaluate a proposed Greenways project's ability to achieve the cultural resources goals:

- Number of significant cultural resources which are nominated to the NRHP, SRHP or designated as local landmarks within any stream reach
- Number of cultural resources for which Greenways Project design and implementation includes active preservation strategies
- Number of opportunities for historic interpretation that are developed within any stream reach

## *3.2 Project Opportunities*

Based upon the goals identified for each of the Greenways Program objectives, as well as the Transportation Master Plan, the Comprehensive Flood and Stormwater Master Plan, the Parks and Recreation Master Plan, the North Boulder Subcommunity Plan, the Aquatic Habitat Study and the Greenways Riparian Habitat Assessment, staff identified and evaluated projects and opportunities for each of the Greenways objectives along the designated tributaries and Boulder Creek. Each tributary is divided into reaches to facilitate a manageable implementation approach for tributary improvements. **Table 3-2** presents the criteria used to rank each reach in terms of objective. Reach rankings were combined into a matrix (**Table 3-3**) that ranked each reach by objective for the purpose of balancing conflicting interests at the time a project is taken forward. This matrix can also be used to identify opportunities to improve low quality habitat in conjunction with other projects.

Conflicts arise in areas where the aquatic and riparian habitat were either classified as high and flood maintenance activities, flood improvements or a path has been proposed. Proposed projects may also conflict with Open Space and Mountain Parks management philosophies. Conflicts have been identified on seven creek segments. Specific recommendations on how to address these conflicts through the evaluation of design alternatives have been identified in the Greenways Master Plan Reach Inventory Projects and Opportunities (**Appendix III**).

**Table 3-4** presents proposed Greenways improvements by Creek. **Table 3-5** presents proposed improvements by reach. A list of projects and opportunities are presented in the "Greenways Master Plan Update Reach Inventory" (**Appendix III**). Because the Greenways program is opportunistic with many projects funded under other departmental and division budgets, grants or UDFCD funding, projects have not been prioritized. Some of these projects will be incorporated into the Greenways Capital Improvement Program budget and others will be part of the individual department/division budgets, based on their priority within the individual capital improvement programs.

**Table 3-2 Criteria for Ranking Greenway Projects by Objective**

| Program Area | Ranking Criteria |
|---|---|
| **Habitat** | **High**<br>• Highest ranked reaches in Riparian Habitat Assessment for vegetative structure, native vegetation and bird habitat<br>• Reaches with species of concern<br>• Reaches with irreplaceable complexity and structure<br>**Medium**<br>• Average ranked reaches in Riparian Habitat Assessment<br>• Somewhat replaceable vegetation (good native but poor structure)<br>**Low**<br>• Lowing ranking reaches in Riparian Habitat Assessment<br>• Areas suitable for restoration |
| **Water Quality** | **High**<br>• Highest ranked reaches in Aquatic Habitat Assessment<br>• High quality aquatic habitat coincident with high quality terrestrial habitat<br>• Fair aquatic habitat adjacent or between high ranked aquatic habitat<br>**Medium**<br>• Fair aquatic habitat<br>• Confluences with Boulder Creek<br>• Riparian or aquatic habitat good over majority of stream length but not necessarily overlapping<br>**Low**<br>• Poor aquatic habitat |
| **Transportation** | **Criteria are listed in order of importance**<br>• Relationship to major destinations such as parks and employment centers<br>• Population density served, particularly relative to major destinations<br>• Lack of good alternative routes, particularly the inability to stay off busy streets<br>• Amount of connectivity to the system added by segment<br>• Amount of the corridor already completed |
| **Recreation** | **High**<br>• Critical trail component is planned to connect or is within a current or future park, recreation area or community or citywide facility<br>**Medium**<br>• Proposed improvement in this Greenways reach may impact the connectivity between park and recreation areas<br>**Low**<br>• Proposed improvement in this Greenways reach is not located near and will not impact the connectivity to current or future park or recreation area |
| **Flood** | **Criteria are listed in order of importance**<br>• Removes property from the high hazard zone or conveyance zone<br>• Removes property from the floodplain<br>• Reduces storm drainage problems |
| **Cultural Resources** | • Presence of cultural site(s) which are listed or eligible for listing on:<br>o National Register of Historic Places<br>o State Register of Historic Properties<br>• Are Historic Landmarks<br>• Are eligible for land marking |

**Table 3-3: Ranking of Greenways Objectives by Reach**

| REACH | LOCATION | HABITAT | WATER QUALITY | TRANSPORTATION[1] | RECREATION | FLOOD MITIGATION | CULTURAL RESOURCES | PARK SITE | Managed by OPEN SPACE | CONFLICT |
|---|---|---|---|---|---|---|---|---|---|---|
| **Fourmile Canyon Creek** | | | | | | | | | | |
| FC 1 | Diagonal to west side of soccer fields | H | H | H | H | M | | | √ | |
| FC 2 | West of soccer fields to 28th St. | M | M | N/A | M | M | | | √ | Flood/ O.S. Mgmt |
| FC 3 | 28th St. to 19th St. | M | M | H | H | H | √ | | | |
| FC 4 | 19th St. to 13th St. | M | M | H | H | H | | | | |
| FC 5 | 13th St. to Open Space | M | M | H | H | H | √ | | √ | |
| **Wonderland Creek** | | | | | | | | | | |
| WC 1 | North Goose Creek to Valmont Rd. | L | M | N/A | H | L | | | | |
| WC 2 | Valmont Rd. to Foothills Pkwy. | M | M | N/A | L | L | | | √ | |
| WC 3 | Foothills Pkwy to 28th St. | H | M | H | L | H | | | | Hab/ Trans |
| WC 4 | 28th St. to 26th St. | M | M | M | N/A | H | √ | | | |
| WC 5 | 26th St. to west side of Centennial | L | L | M | L | H | √ | | | |
| WC 6 | Centennial to 15th St. | M | M | L | N/A | H | | | | |
| WC 7 | 15th St. to Broadway | M | H | N/A | N/A | L | | | | |
| WC 8 | West of Broadway | M | H | N/A | N/A | L | √ | | √ | |

| REACH | LOCATION | HABITAT | WATER QUALITY | TRANSPORTATION[1] | RECREATION | FLOOD MITIGATION | CULTURAL RESOURCES | PARK SITE | Managed by OPEN SPACE | CONFLICT |
|---|---|---|---|---|---|---|---|---|---|---|
| **Goose Creek** | | | | | | | | | | |
| GC 1 North Goose | Pearl Pkwy to Foothills Pkwy | L | L | N/A | H | L | | | | |
| GC 2 South Goose | Pearl Pkwy to Foothills Pkwy. | L | M | N/A | L | L | | | | |
| GC 3 | Foothills Pkwy to RR | H | L | N/A | N/A | L | √ | | | |
| GC 4 | RR to 28th St. | L | L | N/A | L | L | √ | | | |
| GC 5 | 28th St. to Folsom | L | L | N/A | M | L | √ | | | |
| GC 6 | Folsom to 13th St. | L | L | N/A | N/A | H | | | | |
| **Elmers Twomile** | | | | | | | | | | |
| ETC 1 | Goose Creek to Parkside Park | L | L | N/A | H | L | | | | |
| **Boulder Creek** | | | | | | | | | | |
| BC 1 | 63rd to Goose | H | H | H | N/A | M | | | √ | Hab Trans |
| BC 2 | Goose to Foothills | H | H | H | L | M+ | √ | | √ | Hab Trans |
| BC 3 | Foothills to Arapahoe | M | H | N/A | L | H | | | √ | |
| BC 4 | Arapahoe to 30th St. | H | H | N/A | M | H | | | | |
| BC 5 | 30th to Folsom | L | H | M | M | H | √ | | √ | |
| BC 6 | Folsom to 17th St. | M | H | N/A | L | H | √* | | | |
| BC 7 | 17th St. to mouth of Canyon | H | H | N/A | H | H | √* | | √ | |

* Denotes the presence of multiple significant cultural sites

| REACH | LOCATION | HABITAT | WATER QUALITY | TRANSPORTATION[1] | RECREATION | FLOOD MITIGATION | CULTURAL RESOURCES | PARK SITE | Managed by OPEN SPACE | CONFLICT |
|---|---|---|---|---|---|---|---|---|---|---|
| **Skunk Creek** | | | | | | | | | | |
| SC 1 | Arapahoe to Research Park | H | M | N/A | N/A | M | | | | |
| SC 2 | Research Park to Wellman Canal | H | M | L | N/A | M | | | | |
| SC 3 | Wellman Canal to Baseline Rd. | M | M | L | M | H | | √ | | |
| SC 4 | Baseline to Broadway | M | M | M | N/A | H | | | | |
| SC 5 | Broadway to city limits | H | H | N/A | N/A | M | √ | | √ | |
| **Bear Canyon** | | | | | | | | | | |
| BCC 1 | Boulder Creek to Foothills Pkwy. | H | M | N/A | N/A | L | √ | | √ | Hab Flood |
| BCC 2 | Foothills to Baseline | H | L | N/A | M | L | √ | √ | | |
| BCC 3 | Baseline to Hwy 36 | H | L | L | N/A | M | | | | |
| BCC 4 | Hwy 36 to Broadway | L | L | N/A | M | L | | √ | | |
| BCC 5 | Broadway to Lehigh | L | L | N/A | M | M | | √ | | |
| BCC 6 | Lehigh to city limits | H | H | N/A | M | M | | √ | √ | |
| **South Boulder Creek** | | | | | | | | | | |
| SBC 1 | KOA to Lake | M | M | N/A | N/A | M | | √ | √ | |
| SBC 2 | Lake to Arapahoe Road | H | M | L | N/A | M | √ | √ | √ | |
| SBC 3 | Arapahoe to Baseline | H | H | M | M | H | √ | | √ | Hab Trans |
| SBC 4 | South of Baseline | H | H | N/A | N/A | M | | √ | √ | Hab Flood |
| **Bluebell Canyon Creek** | | | | | | | | | | |
| BLC01 | 20th St. to 16th St. | H | L | N/A | N/A | M | | | | |

| REACH | LOCATION | HABITAT | WATER QUALITY | TRANSPORTATION[1] | RECREATION | FLOOD MITIGATION | CULTURAL RESOURCES | PARK SITE | Managed by OPEN SPACE | CONFLICT |
|---|---|---|---|---|---|---|---|---|---|---|
| BLC02 | 16th St. to 12th St. | M | M | N/A | N/A | M | | √ | √ | |
| **Dry Creek # 2** | | | | | | | | | | |
| DC1 | Central Ave to Arapahoe Ave | L | L | L | N/A | M | | | | |
| DC2 | Arapahoe Ave to 55th St | M | L | L | H | M | | √ | | |
| DC3 | 55th St to Baseline Rd | M | L | N/A | N/A | M | | | | |
| **Gregory Canyon Creek** | | | | | | | | | | |
| GRC1 | Boulder Ck to College Ave | H | L | N/A | N/A | H | | √ | √ | |
| GRC2 | College Ave to city limits | H | L | N/A | L | H | | √ | √ | |
| **Sunshine Creek** | | | | | | | | | | |
| SNC1 | Boulder Ck to city limits | H | L | N/A | L | M | | √ | √ | |
| **Two Mile Canyon Creek** | | | | | | | | | | |
| TMC1 | 15th St to city limits | H | L | L | N/A | M+ | | | √ | |
| **Kings Gulch** | | | | | | | | | | |
| KG01 | Skunk Creek to city limits | L | L | N/A | N/A | L | | | √ | |
| **Viele Channel** | | | | | | | | | | |
| VC1 | Viele Lake to South Boulder Creek | | | L | | H | | √ | √ | |

[1] Appendix V presents an explanation of changes to Transportation ammendments

**Table 3-4: Proposed Greenways Improvements by Creek**

| Creek | Proposed Items | | | | | | |
|---|---|---|---|---|---|---|---|
| | Trail (lf) | Underpasses | Drinking Fountains | Flood Mitigation | Restoration (sf) | Restoration/ Preservation (sf) | BMP |
| Boulder | 5,825 | 1 | 0 | TBD | 331,026 | 5,063,904 | 24 |
| Fourmile Canyon | 6,943 | 4 | 3 | * | 159,544 | 526,751 | 4 |
| Wonderland | 5,753 | 3 | 4 | * | 202,886 | 200,991 | 6 |
| Goose | 1,718 | 7 | 0 | ** | 936,360 | 337,773 | 7 |
| Skunk | 3,199 | 2 | 2 | TBD | 162,233 | 0 | 8 |
| Bear Canyon | 511 | 3 | 2 | TBD | 242,014 | 494,024 | 14 |
| South Boulder | 1,363 | 0 | 1 | *** | 0 | 1,003,971 | 5 |
| Elmer's Two Mile | 435 | 2 | 0 | TBD | 154,317 | 0 | 3 |
| Bluebell Canyon | 0 | 0 | 0 | TBD | 0 | 0 | 0 |
| Dry Creek No. 2 | 5,102 | 2 | 0 | *** | 1,354,100 | 0 | 2 |
| Gregory Canyon | 0 | 0 | 0 | TBD | 0 | 1,003,971 | 0 |
| Sunshine Canyon | 0 | 0 | 0 | TBD | 0 | 0 | 0 |
| Two Mile Canyon | 832 | 0 | 0 | *** | 0 | 0 | 0 |
| Viele Channel | 4,313 | 1 | 0 | *** | 0 | 0 | 0 |
| Kings Gulch | 0 | 0 | 0 | TBD | 0 | 0 | 0 |
| Total | 34,994 | 25 | 12 | | 3,542,480 | 8,631,385 | 73 |

* Per Fourmile / Wonderland Final Plan (2011)
** Per USACE Plan (2011)
*** Per South Boulder Creek Major Drainageway Plan (2011)

**Table 3-5: Proposed Greenways Improvements by Reach**

| | Transportation / Recreation | | | Flood | Habitat | | Water Quality |
|---|---|---|---|---|---|---|---|
| | Trail | Underpasses | Fountains | Mitigation | Restoration | Restore/Preserve | BMP |
| **Stream/Reach** | **(LF)** | **#** | **#** | | **(SF)** | **(SF)** | **#** |
| **Fourmile Canyon** | | | | | | | |
| FC1 | 117 | 0 | 0 | - | 0 | 0 | 0 |
| FC2 | 0 | 0 | 1 | - | 159,544 | 0 | 2 |
| FC3 | 3,307 | 2 | 1 | √ | 0 | 340,474 | 0 |
| FC4 | 2,664 | 2 | 1 | √ | 0 | 186,277 | 1 |
| FC5 | 855 | 0 | 0 | √ | 0 | 0 | 1 |
| **Total** | **6,943** | **4** | **3** | | **159,544** | **526,751** | **4** |
| **Wonderland** | | | | | | | |
| WC1 | 0 | 0 | 0 | - | 0 | 0 | 0 |
| WC2 | 136 | 0 | 1 | - | 0 | 0 | 0 |
| WC3 | 3,158 | 3 | 2 | √ | 124,583 | 110254 | 4 |
| WC4 | 195 | 0 | 1 | - | 78,303 | 0 | 0 |
| WC5 | 1,271 | 0 | 0 | √ | 0 | 0 | 0 |
| WC6 | 993 | 0 | 0 | √ | 0 | 90737 | 1 |
| WC7 | 0 | 0 | 0 | √ | 0 | 0 | 1 |
| WC8 | 0 | 0 | 0 | - | 0 | 0 | 0 |
| **Total** | **5,753** | **3** | **4** | | **202,886** | **200,991** | **6** |
| **Goose** | | | | | | | |
| GC1 | 0 | 3 | 0 | - | 369,948 | 0 | 0 |
| GC2 | 1,598 | 4 | 0 | - | 284,721 | 0 | 3 |
| GC3 | 0 | 0 | 0 | - | 0 | 222,789 | 1 |

| | Transportation / Recreation | | | Flood | Habitat | | Water Quality |
|---|---|---|---|---|---|---|---|
| | Trail | Underpasses | Fountains | Mitigation | Restoration | Restore/Preserve | BMP |
| **Stream/Reach** | **(LF)** | **#** | **#** | | **(SF)** | **(SF)** | **#** |
| GC4 | 0 | 0 | 0 | - | 0 | 0 | 1 |
| GC5 | 120 | 0 | 0 | √ | 0 | 0 | 0 |
| GC6 | 0 | 0 | 0 | - | 281,681 | 114,984 | 2 |
| **Total** | **1,718** | **7** | **0** | | **936,350** | **337,773** | **7** |
| **Elmer's Twomile** | | | | | | | |
| ETC1 | 435 | 2 | 0 | - | 154,317 | 0 | 3 |
| **Total** | **435** | **2** | **0** | | **154,317** | **0** | **3** |
| **Boulder** | | | | | | | |
| BC1 | 4,622 | 1 | 0 | - | 0 | 0 | 1 |
| BC2 | 600 | 0 | 0 | - | 0 | 4,424,046 | 7 |
| BC3 | 0 | 0 | 0 | - | 174,448 | 0 | 0 |
| BC4 | 603 | 0 | 0 | - | 53,941 | 488,884 | 4 |
| BC5 | 0 | 0 | 0 | - | 0 | 0 | 2 |
| BC6 | 0 | 0 | 0 | √ | 44,685 | 0 | 2 |
| BC7 | 0 | 0 | 0 | - | 57,952 | 150,974 | 8 |
| **Total** | **5825** | **1** | **0** | | **331,026** | **5,063,904** | **24** |
| **Skunk** | | | | | | | |
| SC1 | 0 | 0 | 0 | - | 0 | 0 | 0 |
| SC2 | 179 | 0 | 2 | - | 0 | 0 | 0 |
| SC3 | 2455 | 1 | 0 | - | 116,623 | 0 | 4 |
| SC4 | 565 | 1 | 0 | √ | 45,610 | 0 | 1 |
| SC5 | 0 | 0 | 0 | - | 0 | 0 | 3 |

| | Transportation / Recreation | | | Flood | Habitat | | Water Quality |
|---|---|---|---|---|---|---|---|
| | Trail | Underpasses | Fountains | Mitigation | Restoration | Restore/Preserve | BMP |
| **Stream/Reach** | **(LF)** | **#** | **#** | | **(SF)** | **(SF)** | **#** |
| **Total** | **3,199** | **2** | **2** | | **162,233** | **0** | **8** |
| **Bear Canyon** | | | | | | | |
| BCC1 | 0 | 1 | 1 | - | 0 | 494,024 | 2 |
| BCC2 | 0 | 0 | 0 | √ | 96,799 | 0 | 2 |
| BCC3 | 0 | 0 | 1 | - | 0 | 0 | 4 |
| BCC4 | 0 | 0 | 0 | - | 145,215 | 0 | 0 |
| BCC5 | 511 | 2 | 0 | - | 0 | 0 | 6 |
| BCC6 | 0 | 0 | 0 | - | 0 | 0 | 0 |
| **Total** | **511** | **3** | **2** | | **242,014** | **494,024** | **14** |
| **South Boulder** | | | | | | | |
| SBC1 | 0 | 0 | 0 | - | 0 | 0 | 4 |
| SBC2 | 129 | 0 | 1 | - | 0 | 1,003,971 | 1 |
| SBC3 | 1234 | 0 | 0 | - | 0 | 0 | 0 |
| SBC4 | 0 | 0 | 0 | - | 0 | 0 | 0 |
| **Total** | **1363** | **0** | **1** | | **0** | **1,003,971** | **5** |
| **Bluebell** | | | | | | | |
| BLC1 | 0 | 0 | 0 | - | 0 | 0 | 0 |
| BLC2 | 0 | 0 | 0 | - | 0 | 0 | 0 |
| **Total** | **0** | **0** | **0** | | **0** | | **0** |
| | | | | | | | |
| **Dry Creek #2** | | | | | | | |
| DC1 | 4,778 | 1 | 0 | √ | 740,361 | 0 | 1 |

| | Transportation / Recreation | | | Flood | Habitat | | Water Quality |
|---|---|---|---|---|---|---|---|
| | Trail | Underpasses | Fountains | Mitigation | Restoration | Restore/Preserve | BMP |
| **Stream/Reach** | **(LF)** | **#** | **#** | | **(SF)** | **(SF)** | **#** |
| DC2 | 324 | 1 | 0 | √ | 613,739 | 0 | 1 |
| DC3 | 0 | 0 | 0 | √ | 0 | 0 | 0 |
| **Total** | **5,102** | **2** | **0** | | **1,354,100** | **$0** | **2** |
| **King's Gulch** | | | | | | | |
| KG1 | 0 | 0 | 0 | - | 0 | 0 | 0 |
| **Total** | **0** | **0** | **0** | | **0** | **0** | **0** |
| **Gregory Canyon** | | | | | | | |
| GRC1 | 0 | 0 | 0 | - | 0 | 0 | 0 |
| GRC2 | 0 | 0 | 0 | - | 0 | 0 | 0 |
| **Total** | **0** | **0** | **0** | | **0** | **0** | **0** |
| **Sunshine** | | | | | | | |
| SNC1 | 0 | 0 | 0 | - | 0 | 0 | 0 |
| **Total** | **0** | **0** | **0** | | **0** | **0** | **0** |
| **Twomile Canyon** | | | | | | | |
| TMC1 | 832 | 0 | 0 | - | 0 | 0 | 0 |
| **Total** | **832** | **0** | **0** | | **0** | **0** | **0** |
| **Viele Channel** | | | | | | | |
| VC1 | 4,313 | 1 | 0 | - | 0 | 0 | 0 |
| **Total** | **4,313** | **1** | **0** | | **0** | **0** | **0** |
| **Grand Total** | **35,994** | **25** | **12** | | **3,542,470** | **7,627,414** | **73** |

## 3.3 Environmental Opportunities

Projects for most of the objectives of the Greenways Program are budgeted under other departmental and divisional budgets. Since all of the Greenways goals and objectives except habitat restoration are covered under the individual master plans and associated City work plans, a list of environmental projects and opportunities has been developed as stand alone projects to be undertaken by the Greenways Program. These projects are described in the Reach Inventory, Projects and Opportunities (**Appendix III**).

As part of the 2001 Greenways Master Plan update process, an interdisciplinary staff team reviewed recent environmental assessment data, field notes, photos, and aerial maps in order to identify opportunities for environmental projects along the Greenways corridors. The team included individuals with experience and training in environmental planning, water quality, riparian plant ecology, aquatic biology, stream restoration, fluvial geomorphology, and floodplain management. In a series of team meetings, the group reviewed the condition of the stream corridors in Boulder in 2001, identified areas appropriate for preservation, and identified opportunities for environmental enhancement and restoration projects. Types of environmental projects on the Greenways Master Plan Map and Reach Inventory include:

- Preservation of high quality terrestrial and aquatic habitat
- Enhancements to terrestrial and aquatic habitat
- Restoration and creation of riparian wetlands
- Construction of water quality Best Management Practices for treatment of pollutants at stormwater outfalls, sediment collection and removal, and non-point source pollution filtering
- Removal of barriers to fish passage
- Increasing the width of expression of the riparian wetland and upland buffer area
- Limiting mowing
- Weed control
- Day-lighting piped, underground creek sections
- Removing structural channel segments and replacing with bio-engineered methods
- Property acquisition

Additionally, programs were identified to address system-wide environmental concerns. These included landowner education related to creek care and a maintenance program including weed control.

From these projects, staff identified a list of top priority environmental projects (**Table 3-6**). Project prioritization involved tabulation of all identified Greenways environmental projects, application of a scoring system for projects and ranking of projects based on Greenway objectives and environmental assessments. Scores for the projects were developed from environmental studies, a matrix of overlapping and conflicting objectives and the results of a weighting analysis of stresses on Greenways riparian habitat and water quality. The stress analysis was based on a methodology developed by The Nature Conservancy entitled, "The 5-S Framework for Site Conservation." The method involves:

- Identifying specific functions of the Greenways that are environmentally impaired system-wide
- Evaluating severity and extent of stresses on riparian and water quality functions
- Identifying mitigation strategies to alleviate these stresses

Identified mitigation strategies were assigned weighting factors in terms of feasibility, cost and effectiveness. Results of the stress analysis are summarized in **Table 3-7**. The stress analysis was system-wide and was applied to Boulder Creek and its tributaries. The list of environmental projects and opportunities was reviewed to categorize the type of mitigation strategy which would be accomplished by each project. The overall scoring system included habitat quality, overlap or conflict with other Greenways, objectives within the reach, property ownership, and risk of failure.

Funding for habitat maintenance and stand alone restoration projects was first allocated in the 2002-2007 Greenways CIP. In an effort to evaluate the effectiveness of the habitat maintenance program, an outside consultant, Biohabitats Inc., was hired in 2007. In addition to reviewing routine maintenance practices (summarized in **Section 4.0 Maintenance and Funding**), Biohabitats evaluated opportunities for restoration projects and developed a list of possible habitat improvement sites based on habitat condition, location and opportunity for improvement. The following lists some near term proposed habitat improvement sites along with any related issues:

- Bear Canyon Creek near the hospital (BRC32) – project will require a large scale design effort
- Wonderland Creek at the Anna Dunn Property (WC1) – tree and shrub planting with possible water rights issues
- Fourmile Canyon Creek (FCC16) – shrub planting following crack willow removal, feasibility dependant on flood mitigation work
- Scott Carpenter Park (BC5) – regarding issues because of old landfill areas
- Flatirons Golf Course (DC-07) – need for review of opportunities and limitations due to recreation
- South Boulder Creek (HW36) – sedimentation and erosion mitigation

Biohabitats also created a ranked list in 2007 of habitat reaches on public properties for possible habitat restoration projects. This ranking is provided in **Appendix V1**.

A thesis was prepared by Robert Zuellig in 2001 evaluating the macroinvertebrate and fish communities along the Front Range of Colorado and their relationship to habitat in the urban environment. In Boulder, Bear Creek, Lower Goose Creek, Upper Goose Creek and Fourmile Canyon Creek were evaluated. The conclusion of the thesis was that recent needs to improve stormwater drainage within urban growth areas have resulted in biological impacts. Specifically, projects that straighten, deepen and widen the stream channel for flood conveyance provide a poor environment for macroinvertebrate and fish communities. Pool and riffle development should be encouraged in stormwater design without the use of vertical drop structures, which flatten the slope and potentially block the upstream movement of aquatic organisms.

**Table 3-6: Top Priority Environmental Projects Ranked by Project Scores**

Costs based on: $60,000/acre for restoration
$30,000/acre for restoration/preservation
$1,000/acre for preservation
$50,000 per BMP

1. FC4 – Stream corridor enhancement and BMP at Violet Park
   Preservation (#27): 186276 $ft^2$ or 4.28 acres
   Restoration (#27): 186276 $ft^2$ or 4.28 acres
   (4.28 P/R acres @ $30,000/acre)
   Water Quality BMPs (#40) (@ $50,000 each)
   Cost: $180,000

2. FC3 – Stream corridor enhancement $26^{th}$ to $28^{th}$
   Preservation (#31): 164693 $ft^2$ or 3.78 acres
   Restoration (#31): 164693 $ft^2$ or 3.78 acres
   (3.78 P/R acres @ $30,000/acre)
   Cost: $115,000

3. BC7 – Improve water quality of kid's fishing pond, implement BMPs and revegetate banks through Eben G. Fine Park
   Preservation (#24): 472549 $ft^2$ or 10.85 acres (@ $1,000 per acre)
   Preservation (#23): 150973 $ft^2$ or 3.47 acres
   Restoration (#23): 150973 $ft^2$ or 3.47 acres
   (3.47 P/R acres @ $30,000/acre)
   Water Quality BMPs (#47, 48, 64, 65) (@ $50,000 each)
   Cost: $315,000

4. GC2 – Lower Goose Creek stream enhancement
   Preservation (#40): 101576 $ft^2$ or 2.33 acres (@ $1,000 per acre)
   Restoration (#41): 150405 $ft^2$ or 3.45 acres (@ $60,000 per acre)
   Restoration (#42): 134314 $ft^2$ or 3.08 acres (@ $60,000 per acre)
   Water Quality BMPs (#55, 56, 75) (@ $50,000 each)
   Cost: $545,000

5. FC2 – Stream enhancement and sediment control downstream of 28th
   Restoration (#43): 159542 $ft^2$ or 3.66 acres (@ $60,000 per acre)
   Water Quality BMPs (#41, 42) (@ $50,000 each)
   Cost: $320,000

6. BCC5 – Water quality BMPs along Table Mesa drive
   Water Quality BMPs (#9, 10, 11, 12, 13, 14) (@ $50,000 each)
   Cost: $300,000

7 BCC1- Protect and enhance stream corridor and wetland south of Arapahoe
   Preservation (#21): 494018 $ft^2$ or 11.34 acres
   Restoration (#21): 494018 ft 2 or 11.34 acres

(11.34 P/R acres @ $30,000/acre)
Water Quality BMPs (#21, 22) (@ $50,000 each)
Cost: $440,000

8 WC2 – Preserve and widen stream corridor at Christiansen Park and restore pond

Preservation (#7): 84516 ft2 or 1.94 acres (@$1,000 per acre)
Restoration (#8): 91304 ft2 or 2.10 acres (@ $60,000 per acre)
Cost: $130,000

9. FC3 – Stream corridor protection and enhancement upstream of 26th

Preservation (#28, 29, 30): 175778 ft2 or 4.04 acres
Restoration (#28, 29, 30): 175778 ft2 or 4.04 acres
(4.04 P/R acres @ $30,000/acre)
Cost: $125,000

**Table 3-7: Summary Table from Stress Analysis**

| Active Threats Across Systems | Assimilation Capacity | Aesthetics | Aquatic Habitat | In Channel Recreation | Wildlife Habitat | Native Vegetation | Overall Threat Rank | Total Score |
|---|---|---|---|---|---|---|---|---|
| Primary home development | High | Low | Very High | Low | Very High | Very High | Very High | 6.53 |
| Commercial/industrial development | High | Low | Very High | - | Very High | Very High | Very High | 6.52 |
| Channelization of rivers or streams | High | - | Very High | - | Very High | Very High | Very High | 6.50 |
| Construction/Development | Medium | Medium | Very High | Medium | Very High | Very High | Very High | 6.30 |
| Roads or utilities | Very High | - | Very High | - | Very High | - | Very High | 6.00 |
| Recreational use | Medium | Low | Very High | Low | High | High | High | 4.13 |
| Ditches, dikes, drainage or diversions | High | - | Very High | High | - | - | High | 4.00 |
| Flood control | - | - | Very High | - | - | - | High | 3.00 |
| Invasive/alien species | - | - | - | - | - | Very High | High | 3.00 |
| Weed invasion | - | - | - | - | High | - | Medium | 1.00 |
| Storm sewer system (outfalls) | - | Low | - | - | - | - | Low | 0.03 |
| Nutrient loading | - | Low | - | - | - | - | Low | 0.03 |
| Parasites, pathogens, wildlife, pets | - | - | - | Low | - | - | Low | 0.03 |
| **Threat Status for Targets and Site** | Very High | Low | Very High | Medium | Very High | Very High | Very High | |

| Strategies Across Systems | Assimilation Capacity | Aesthetics | Aquatic Habitat | In Channel Recreation | Wildlife Habitat | Native Vegetation | Strategy Benefit Rank | Total Score |
|---|---|---|---|---|---|---|---|---|
| Public education | High | Low | Very High | Low | Very High | Very High | Very High | 6.53 |
| Habitat restoration | High | - | Very High | - | Very High | Very High | Very High | 6.50 |
| Design and Construction Standards | Low | - | Very High | - | Very High | Very High | Very High | 6.02 |
| Habitat preservation | High | - | Very High | - | Very High | High | Very High | 5.50 |
| Acquisition & buffer enhancement | Medium | - | - | - | Very High | Very High | Very High | 4.60 |
| Conservation easement | - | - | - | - | Very High | Very High | Very High | 4.50 |
| Eliminate ditch capture | High | - | Very High | High | - | - | High | 4.00 |
| Weed management | - | - | - | - | High | Very High | High | 3.50 |
| Structural BMP implementation | High | Medium | Medium | - | - | - | Medium | 1.40 |
| Erosion control BMPs at construction sites | Medium | - | Medium | - | - | - | Medium | 0.43 |

**Table 3-7: Summary Table from Stress Analysis Continued**

| Strategies | Benefits | | | Feasibility | | | Cost | Overall |
|---|---|---|---|---|---|---|---|---|
| | Active Threat Abatement Rank | Leverage | Overall Benefits | Lead Individual / Institution | Ease of Implementation | Overall Feasibility | Overall Cost | Overall Strategy Rank |
| Acquisition & buffer enhancement | Very High | Medium | Very High | Medium | Medium | Medium | Very High | High |
| Conservation easement | Very High | High | Very High | Medium | Low | Low | High | Medium |
| Eliminate ditch capture | High | High | High | Low | Low | Low | Very High | Low |
| Erosion control BMPs at construction sites | Low | High | Medium | Very High | High | High | Low | High |
| Design / Construction Standards | Very High | Very High | Very High | High | Medium | Medium | Medium | Very High |
| Habitat Preservation | Very High | Medium | Very High | Very High | High | High | Low | Very High |
| Habitat restoration | Very High | Medium | Very High | High | Medium | Medium | High | High |
| Public education | Very High | Very High | Very High | High | High | High | Medium | Very High |
| Structural BMP implementation | Medium | Medium | Medium | Medium | Medium | Medium | Low | High |
| Weed management | High | Very High | Very High | High | High | High | Very High | High |

## *3.4 Program Expansion Opportunities*

During the 2001 Master Plan update process, several opportunities to add or expand current Greenways activities were identified by the interdepartmental Greenways Coordination Team. There is no current timeline for implementing these proposed program elements.

**Education and Community Opportunities**

Possible future public education efforts could include a program designed to educate adjacent property owners concerning the effects of weeds and ornamental escapees on the vegetation structure and habitat value of the Greenways and encouraging removal of exotic plantings.

Several restoration themes have been suggested as a result of the habitat assessment study. These include:

- **Creek Care 101**: A certificate training program for people of groups whose property includes riparian areas could be established. This program could include basic lessons in creek hydrology, riparian ecology, and training in management techniques appropriate for restoration and maintenance of the natural functions. Each training course could culminate with an on-the-ground project in the focus area/tributary.
- **Land Stewardship Extension**: This program would provide brochures, web documents, handbooks, access to tools and other forms of technical assistance to give people the information and implements they might need to undertake restoration projects.
- **Adopt-a-Reach**: Many business facilities are located along the creeks (Arapahoe Village, CU Research Park, Flatiron Park, Goose Creek downstream of Folsom St., etc.). Establishing a litter/trash pick-up program equivalent to the adopt-a-road program could improve conditions along the creeks and provide public relations benefits. Eventually, more significant projects could be undertaken.
- **Interpretive Program**: The Greenways trails are central and accessible. Many people use them as transportation corridors and recreational facilities. Fewer know the interesting stories the corridors have to tell. City staff and local naturalists could offer nature walks and rides, install interpretive signs, and develop brochures.
- **Partnerships with Schools**: Several public and private schools are involved in environmental studies programs. Many are examining water quality through the Colorado Division of Wildlife's River Watch program. Many opportunities exist to broaden the educational experience to include botany, zoology and issues of land management.

**Wetlands Banking**

A wetlands mitigation bank is a wetland area that has been restored, created, enhanced or preserved, which is then set aside to compensate for future conversions of wetlands for development activities. The city currently does not have a wetlands mitigation banking process, although the possibility of this type of program has been evaluated in the past. Among the benefits of establishing a wetlands mitigation bank are that uncertainty and delay are reduced for qualified projects, and that successful mitigation can be ensured since compensatory wetlands areas exist and are functional in advance of proposed project impacts.

Further discussions of such a program are warranted. A wetlands banking program basically facilitates mitigation in advance of wetlands impacts. As wetland enhancement projects along the Greenways are completed, they are "banked" as credits against future city projects which may be unable to avoid wetland effects. The credits banked in advance of proposed impacts may streamline permitting processes. In addition, since mitigation has been successfully completed in advance of proposed wetlands impacts, replacement areas are already established and functioning. The development of a wetlands mitigation bank would not only benefit future Greenways projects, but other city projects (Transportation, Utilities, etc.) which may involve wetland impacts. "Banked" wetlands could also serve as examples of successful wetlands mitigation projects for private developers.

**Stewards of the Greenways**

Public stewardship for the Greenways could be encouraged through an "Adopt-a-Trail" program. Members of the public would be encouraged to collect trash, monitor conditions along a specified reach, etc. and report any perceived problems to the Greenways Program.

Various counties and states throughout the country have implemented successful "Adopt-a-Trail" programs. A few of the programs that are especially pertinent to the Greenways Program are:

- **Greenways Walkers**: People who frequent the Greenways can be encouraged to pick up trash and report maintenance problems to the Street and Bikeway Maintenance hotline at 303-413-7177.
- **Greenways Adopters**: Adopters may be individuals, families or groups. Basic tasks, following appropriate training by City staff, would include vegetation trimming, drainage way cleaning and litter removal. With experience, volunteers could be involved in the performance of more complicated maintenance and enhancement tasks.

**Special Projects**

Groups or individuals may be interested in involvement in single project, rather than on-going monitoring and maintenance responsibilities. The Greenways Coordinator could establish and maintain a list of projects for community volunteers.

## *3.5 Project Implementation*

Greenways project typically involve flood mitigation and trail components. All Greenways projects are reviewed by the Greenways Advisory Committee (GAC). The GAC is made up of one representative from the Water Resources Advisory Board (WRAB), Transportation Advisory Board (TAB), Parks and Recreation Advisory Board (PRAB), the Open Space Board of Trustees (OSBT), Environmental Advisory Board (EAB) and Planning Board, designated by the chair of each of the boards. The members of the GAC act as the representative and liaison for their respective board on Greenways issues and interests. The Committee provides a single point of contact for the public to bring comments and allow an opportunity for discussion where all of the Greenways Program objectives are represented.

The following **public involvement process** will be incorporated into all Greenways Program projects:

1. The first step in initiating a Greenways project is to identify property ownership.

2. In locations where the Greenway is not within a city easement or right-of-way, the property owners will be contacted immediately to initiate easement negotiations and incorporate property owner interests into conceptual design alternatives. Property owners adjacent to the Greenway will also be contacted.
3. The Project Manager will develop various conceptual design alternatives, which will be presented to adjacent property owners. Property owner concerns and interests will be incorporated into the Community and Environmental Assessment Process (CEAP) alternatives.
4. The CEAP process is described below and outlined in **Appendix I**.

**Capital Improvement Program (CIP)**

The Greenways Coordinator, in conjunction with a group of staff representing all the objectives of the Greenways Program (Greenways Coordination Team), identifies projects for the CIP based on development activities, available outside funding sources and the opportunity to coordinate work with other City projects. The CIP is developed for a 6-year period, consistent with the rest of the City.

**Individual Project Review Process**

The Greenways Coordinator or project manager, in conjunction with the Greenways Coordination Team, develops alternatives and conceptual plans as part of the CEAP. Development of the CEAP for Greenways projects is consistent with other city CIP projects and includes review by the CEAP staff review group. In general, a CEAP is prepared for projects which may have a significant impact on environmental, social or cultural resources; which involve neighborhood or community controversy; or which involve one or more conceptual alternatives that require community input.

All capital projects ($50,000 or more) proposed within a Greenway (whether funded through the Greenways Program, a private developer or another City workgroup) will be reviewed by the Greenways Coordinator and Greenways Coordination Team for compliance with the Greenways Master Plan and City of Boulder Design and Construction Standards.

**External Review of CIP and CEAP**

The Capital Improvement Program (CIP) and Community and Environmental Assessment Process (CEAP) for Greenways projects will be reviewed by the Greenways Advisory Committee (GAC) in a public hearing. The Water Resources Advisory Board (WRAB), Transportation Advisory Board (TAB), Parks and Recreation Advisory Board (PRAB), Open Space Board of Trustees (OSBT), Environmental Advisory Board (EAB) and Planning Board will receive a copy of the CIP and CEAPs as an information item (non-agenda) with comments directed to the GAC and/or the Greenways Coordinator. The Greenways CIP will also be brought to the Planning Board for recommendation, consistent with all other City CIPs. The GAC will provide recommendations to staff and the Planning Board on the Greenways Program CIP and will approve the CEAP subject to Council call-up. All projects on land managed by Parks or Open Space are taken to those respective boards in a joint hearing with the GAC for approval of the CEAP, subject to Council call-up. Project CEAPs for projects within a Greenway that are being funded outside the Greenways Program budget will be provided to the GAC as an information item to give the GAC an opportunity to provide comments to staff and/or

the sponsoring advisory board, with the sponsoring advisory board approving the CEAP, subject to Council call-up. Once approved, the CEAP recommendations provide the basis for final design of the project. **Appendix I** presents the Community and Environmental Assessment Process. This process requires consideration of social and environmental impacts from all proposed project features including issues related characteristics of features such as trails systems (paved versus unpaved for example) and flood mitigation improvements (nonstructural versus structural for example).

**Checklist for Permit Compliance**

There is usually a series of standard permit requirements for Greenways projects, and under certain circumstances, additional external reviews are needed:

**Standard Project Permits**:

- **Corps of Engineers Section 404 Permit**
  The U.S. Army Corps of Engineers District Engineer determines if the project qualifies for authorization under Nationwide Permits (most Greenways projects can be authorized under Nationwide Permits). If a Nationwide Permit is not deemed appropriate, an individual permit is required. The individual permit process has specific public notification provisions.
- **Municipal Wetlands Permit**
  The City notifies owners of properties within 300 feet of the project boundary and any other interested parties who have requested notification. These people have 14 days to comment on the proposal. The Floodplain and Wetlands Coordinator posts notice of the wetland permit application with the comment deadline. The Floodplain and Wetlands Coordinator may approve the permit application, deny it, or refer it to the Planning Board for decision. Floodplain and Wetlands Coordinator approvals or denials are subject to Planning Board call-up. Denials may be appealed to the Planning Board. Decisions not appealed or called up by the Planning Board become final 14 days following notification.
- **Floodplain Development Permit**
  The Floodplain and Wetlands Coordinator reviews and decides on all applications; however, if a change in a watercourse is proposed, the application is referred to the Planning Board. For high hazard and conveyance zone permits, the Floodplain and Wetlands Coordinator forwards the permits to City Council and publishes a newspaper notice. The permit becomes effective 21 days after issuance. City Council may call up variances or approvals.

**Interdepartmental Cooperative Procedures**

When a Greenways improvement project is proposed on city Park or Open Space and Mountain Park (OSMP) lands, the project must be carefully coordinated with the appropriate department staff and in the case of OSMP the Board of Trustees. Coordination must begin prior to development of conceptual design and continue through to post-construction of the project. The Greenways Master Plan Map (**Pocket**) shows Parks and Open Space and Mountain Parks sites. The City Parks Department has an Urban Wildlife Coordinator that can assist with environmental elements of project evaluations and conceptual design. A list of these sites is provided in **Tables 2-1** and **2-2**. **Appendix IV** presents a guideline for coordination with Parks and Open Space.

**External Review and Approval Processes**

- **Urban Drainage and Flood Control District (UDFCD).** All Greenways improvement projects involving flood mitigation will be reviewed by UDFCD.
- **Colorado Department of Transportation (CDOT)**. Projects that affect CDOT rights-of-way and rely on CDOT funding are subject to CDOT review.
- **Boulder County**. Greenways projects that affect lands under Boulder County jurisdiction may require a County permitting process, ranging in scope from a County floodplain permit to a building or grading permit to an Areas or Activities of State Interest (1041) Permit. Most Boulder County permitting processes involve Planning Commission or other County advisory board review, as well as a public hearing before the Board of County Commissioners.
- **University of Colorado**. Greenways projects that affect University of Colorado land will be coordinated with the appropriate University personnel.
- **U.S. Fish and Wildlife Service (USFWS)** - The USFWS review of proposed projects for impacts to threatened and endangered species occurs in conjunction with the 404 wetlands permitting process. The USFWS is provided with survey results or a statement of why surveys for individual species are not needed. The USFWS generally issues letters of clearance when projects will not adversely affect threatened and endangered species.
- **Federal land managing agency review**. Projects that affect federal land undergo review by the land managing agency to ensure compliance with all federal legislation and management directives, including the National Environmental Policy Act (NEPA) and National Historic Preservation Act. Federal review processes usually have opportunities for public review and participation.

**Cultural Resources**

The Greenways cultural resources inventory identified the historical significance of individual historic sites within the Greenways corridors. Greenways projects which potentially affect sites listed or eligible for listing on the National or State Register of Historic Places should consider the potential effects of project implementation on site significance as a part of the Project CEAP. Coordination with the Landmarks Board will be needed for projects affecting city landmarks.

In addition to recommendations concerning individual historic site significance, the Greenways Cultural Resources Inventory made the following general cultural resource management recommendations for the Greenways Program:

- Significant cultural properties should be actively preserved and maintained, whether or not they have been listed on the NRHP or land marked.
- Cultural properties that are owned by the city, such as Eben G. Fine and Central Parks, should have preservation of their historical integrity as a priority. The archaeological sites such as the Boyd Smelter, and City Dump at Scott Carpenter Park should be protected from looting. Any new trail construction or alteration, or any earth disturbing activity near these sites should be monitored by an archaeologist to insure remains are not destroyed.

- While ditches and railroads have their own legally protected rights-of-way, the owners should be encouraged to maintain the properties in their historical condition whenever possible.
- The Boulder Valley School District and the University of Colorado should be encouraged to maintain the field buildings at the High School (several of which are not currently used) and the CCC stonework near the High School and on CU property. Some of the stone walls and terraces at CU are in need of repair.

Interpretive signs and/or brochures discussing specific cultural resources and general historical data can be useful and informative to the public. Interpretive signs can be placed anywhere a cultural property is encountered along a Greenway. The most appropriate location for historical interpretation is along Boulder Creek: Reach 7 - from Eben G. Fine Park to 9th Street or Broadway. While some of the history does not have extant cultural manifestations, it can still be readily demonstrated with historical photos. This would also provide some continuity with the interpretive signs done by Boulder County for the Pioneer Trail, which extends west up Boulder Canyon from Eben G. Fine Park.

**Post-Project Monitoring Report**

During project design, permitting, and construction, each Greenways project will have a post-project monitoring procedure developed by the Greenways Coordinator and Greenways Coordination Team. This procedure will outline any monitoring and reporting requirements associated with project permits (e.g., a Municipal Wetlands Permit may require five years of monitoring following completion of the project) and identify measures of project success and monitoring intervals for each of the primary goals and objectives addressed by the project. The Greenways Coordinator will be responsible for ensuring that post-project monitoring is completed and the results are reported to the Greenways Coordination Team. The Greenways Coordination Team will be responsible for developing a plan for correcting any post-project problems. Completion of corrective programs may be undertaken by maintenance staff, or, if under warranty, by project contractors.

Following completion of all monitoring requirements, a post-project monitoring report will be prepared for each project. The report will include:

- Frequencies and types of monitoring
- Results of monitoring including photographic documentation
- Problems encountered (including complaints received, if any) and how they were resolved
- Suggestions for future projects

In addition to providing valuable information concerning successful strategies for project completion, the post-project monitoring report will provide a baseline for evaluating project condition over time.

# 4 Maintenance and Funding

This chapter presents a summary of how the Greenways Program is maintained and funded.

## *4.1 Maintenance Responsibilities*

Greenways Program maintenance activities include weed control, mowing, removal of snow and sweeping of trails, tree removal and pruning. Small rehabilitation projects also fall under the maintenance program and are usually funded by the UDFCD.

The Greenways maintenance program objectives are to:

1. Clearly define maintenance responsibilities
2. Implement consistent maintenance standards
3. Use appropriate resources for the overall system maintenance including tree maintenance and weed control
4. Use a formal review procedure for capital projects to ensure project elements are maintainable
5. Clearly define landowners' responsibilities

Within the city of Boulder, the Greenways system is maintained by the following city departments: Transportation, Parks Open Space and Mountain Parks, and Public Works, and public property managers included Boulder Valley School District, University of Colorado, and Boulder County Transportation Department. In addition, private property owners are required to maintain trees that overhand city owned right of way.

A map titled City of Boulder Multi-Use Path Maintenance Management Map in the pocket of this plan shows maintenance responsibilities by entity and trail segment. Tasks are divided by geographical location, as well as function. In an effort to clarify existing responsibilities and establish consistent levels of service, a matrix of current maintenance practices was developed (**Table 4-1**). The table identifies the tasks and frequency of each task as performed by each work group.

In an effort to reduce confusion regarding maintenance responsibilities, a procedure for reporting, tracking and correcting maintenance problems was established. All Greenways maintenance problems can be reported to the Street and Bikeway Maintenance Hotline at 303-413-7177. The Bikeways Maintenance staff will follow up on the problems that are within their jurisdiction and forward the other items to the appropriate work group. A database of reported maintenance problems is kept by Street Maintenance and other groups have access to this information.

**Consistent Maintenance Standards**

Both Parks Maintenance and Bikeways Maintenance are responsible for the multi-use paths along the Greenways in different locations. Parks Department maintains the Boulder Creek Path and paths located within city parks. Bikeways Maintenance maintains all other paths outside of Open Space and Mountain Parks. During snow events, Bikeways Maintenance operates two 12-hour crews per day that work continuously until all paths are clear of snow. The Parks

Department operates two 8-hour crews per day with overtime as necessary. Snow removal from the Boulder Creek path is a higher priority than other paths located through park lands.

**Weed Control and Habitat Maintenance**

The Greenways system is currently maintained for transportation, recreation, noxious weeds and stormwater conveyance. While the focus of maintenance efforts has been on the trail system and stream conveyance for flood control, it is also important to maintain the Greenways for habitat and water quality and to control weeds. Specific activities considered for habitat maintenance are listed below.

- Weed control and planting of natives
- Mowing at the right time and to the right height
- Preserving an un-mowed vegetative buffer
- Improving tree care
- Accelerated trimming of branches
- Managing social trails
- Fencing sensitive areas
- Repairing, replacing, and updating educational signs
- Increasing volunteer cleanup events
- Adding more pet cleanup stations
- Re-vegetating trampled banks
- Improving ground cover and structure of buffer vegetation
- Increasing sweeping and removing swept materials
- Diverting wash water away from creek
- Maintaining water quality BMPs and controlling sediment
- Using bio-engineered methods for flood control maintenance
- Removing dead animals from the drainage ways

Greenways maintenance practices are conducted in a way to meet environmental objectives and control weeds along the Greenways trail corridors. A seasonal Habitat Maintenance crew and crew leader are hired annually (since 2002) to remove noxious weeds and revegetate with native plants along the Greenways corridors. In 2007, the city hired a consultant (Biohabitats) to evaluate the habitat maintenance program and develop a work plan. The following recommendations were made and have been implemented:

- Prioritize weed species for control
- Prevent new occurrences of selected weed species
- Map locations of selected weed species
- Prioritize areas for weed control based on size (i.e. small occurrences) and location (i.e., isolated from other occurrences of the same species)
- Select control methods that are appropriate given the weed category (i.e., biennials, short-lived perennials, root sprouting, rhizomatous, and re-sprouting weeds and woody species)
- Establish a monitoring program for weed management (e.g., a straightforward and inexpensive program based on SMART objectives (Specific, Measurable, Achievable, Relevant, Time-bound)
- Use ongoing scouting to locate new occurrences of selected biennial and short-lived perennial weeds and eradicate them
- Use ongoing scouting to locate new occurrences of long-lived rhizomatous perennial

weeds and control and manage them
- Judiciously use herbicides or other alternative management practices in conjunction with current methods to control root-sprouting, rhizomatous or re-sprouting weeds and invasive woody species with the focus on the State of Colorado A-list noxious weeds (purple loosestrife and myrtle spurge), invasive trees (Russian olive, crack willow) and shrubs (common buckthorn, honeysuckle, common privet)
- Consider transferring some or all of weed control responsibilities to another entity (within or outside of the City)

The following recently completed projects will require ongoing maintenance:

- Elmers Two Mile Creek (ETC1) Park Site located between Iris Avenue and Glenwood Drive - replacement of a concrete low-flow channel with native vegetation in 2002
- Skunk Creek 'Basemar / Skunk Creek' (SC-06) located east of Broadway, west of 27th Street - planted in 2003
- Bear Creek 'Martin Park' (BRC-12) - west bank planted in 2004-2006
- Wonderland Creek (WC-15) - three areas located north of Valmont Road and east of King's Ridge Boulevard:
  - 'The Fishbowl' planted in 2004-2005
  - 'Above the Fishbowl' planted in 2005-2006
  - 'Kings Ridge Boulevard' planted in 2005
- Boulder Creek (BC-22) located south of Arapahoe between 17th Street and 19th Street - 'Mary Wolff Park' planted in 2005-2006
- Boulder Creek (BS-34) located just south of Arapahoe between 29th Street and 30th Street - 'Scott Carpenter Park' north bank planted in 2005-2006
- Boulder Creek (BC-51) located south of Pearl Parkway west of 55th Street - 'Cottonwood Ponds' northeast side planted in 2005
- Elmers Two Mile Creek (ETC1) Iris Avenue underpass and path connection to Juniper Avenue - plantings in 2007 in association with the project
- Dry Creek No. 2 (DC2) habitat restoration through golf course - 2008
- Elmers Two Mile Creek (ETC1) Greenways Improvement Project between Goose Creek and Glenwood Drive - flood mitigation, water quality enhancement and multi-use path extension in 2010
- Boulder Creek (BC2) 48th Street path connection to Boulder Creek Trail and bridge crossing - 2011

Beginning with the 2008 season, the oversight of the Habitat Maintenance crew was transferred to the Flood Utilities Maintenance work group. As part of the Flood Utilities 2009 operating budget, a new full-time Greenways Maintenance crew lead position was requested, along with a $30,000 budget increase request to help fund this position. The balance of the funding needed to support this position will be taken out of the existing Greenways CIP budget, along with the funding to support the seasonal crew. In addition to managing noxious weeds along the Greenways, this position will also be responsible for maintaining the flood carrying capacity of the drainage ways. In 2010, a one-year fixed-term position was approved for a Maintenance III position. This position will include Habitat Maintenance crew leadership for the field season and flood maintenance for the off season. Having a full-time employee serving as a crew lead, rather than a seasonal employee, will provide the season to season continuity that the Habitat

Maintenance program needs and coordination with other entities such as OSMP that provide habitat maintenance within the city. Funding for this position is being evaluated in 2011 through a staffing analysis.

**Tree Maintenance**
Tree maintenance activities along Greenways paths are performed by different city work groups depending upon tree ownership and the location and type of tree work needed. Forestry staff proactively performs tree safety surveys every seven years for both public and private trees overhanging all Greenways paths outside of Open Space and Mountain Parks lands. Trees on public property posing a potential safety concern to the bike path receive the required corrective action. Dead trees or those with major structural defects are removed and trees with broken, cracked, hanging or dead branches are pruned to prevent them from falling onto the path or injuring trail users. When trees on private property threaten public safety, Forestry staff notifies private property owners of their responsibility to provide the necessary corrective action for private trees per the process outlined in Boulder Revised Code 6-6-2.

Bikeways Maintenance staff prunes trees along all Greenways paths they maintain except areas within city parks or along Boulder Creek to provide eight to twelve feet of clearance above the path surface. Within park sites and along the Boulder Creek Path, Parks and Forestry staff prunes trees to provide clearance. Requests or complaints regarding trees are handled by either Bikeways Maintenance or Forestry staff for their jurisdictional areas.

Trees in natural areas that are far enough away from the bike path do not receive maintenance and are left in their natural state. When trees are pruned, generally only the path side is pruned, and anything over-hanging the creek is generally not included. Flood Control staff responds to tree and debris removal when they fall into the creek and restrict water flow, or on a complaint driven basis

**Streets and Bikeway Maintenance**
Within the City of Boulder, there are currently 61 total miles of multi-use paths, approximately 25 miles of which are Greenways paths. The Parks and Recreation Department maintains the Boulder Creek path, which is approximately 5.5 miles long. The University of Colorado, Boulder County, and private entities maintain approximately 13 miles of the system, and the Bikeways Maintenance work group maintains the remaining 43 miles, which includes both Greenways and non-Greenways paths.

**Landowners' Responsibilities**
According to state and local ordinances, property owners are responsible for controlling the weeds on their land. The Greenways Program does not own property, although some lands traversed by Greenways trails include city rights-of-way, Parks Department property and Open Space and Mountain Parks property. The Greenways corridors pass through various public and private lands, with non-standardized easement language or agreements about maintenance. Therefore, the responsibility for weed control is a complicated issue. The city typically maintains the trail and six-foot shoulders on each side. According to local ordinances, property owners are responsible for taking corrective action when notified of dangerous or diseased trees on their land. Forestry staff takes the lead on enforcement action when problem trees are identified after surveys or on a complaint basis.

## 4.2 Funding

The Greenways Coordinator is part of the Utilities organizational structure, reporting to the Utilities Project Coordinator. The Greenways Coordinator works with an interdepartmental staff review group (the Greenways Coordination Team) to represent the various objectives of the Program. The Greenways Coordination Team is responsible for coordinating information about the Program with their board members and other city staff from their departments.

In order to maximize the overlap of objectives and to coordinate projects along the Greenways, identification of projects for annual Greenways CIP has been done as a team effort, combining input from Flood Utilities, Transportation, Parks and Recreation, Water Quality and Environmental Services, Environmental Affairs, Planning and Open Space and Mountain Parks. The Greenways CIP follows an opportunistic approach, contributing funding toward projects that are being completed by other departments or private development in order to meet the various objectives of the Greenways program. The Greenways CIP also looks to leverage funds with outside agencies in order to move projects forward that meet more than one objective of the Greenways program, but may not be the highest priority when evaluating any one particular objective.

Transportation and flood utility projects are identified from the Transportation Master Plan and major drainageway plans. Private development activities are also evaluated. Intra-departmental meetings are held to determine project priorities and timing. Many of the Greenways projects shown in the CIP are being designed and constructed in coordination with major flood or transportation improvements. The Greenways funding associated with these projects focuses on habitat restoration, water quality improvements and trail connections. In addition to leveraging funding with the Transportation and Flood Utilities budgets, funding for Greenways projects is also available through the Urban Drainage and Flood Control District and Federal Transportation funds.

Greenways projects have been historically funded from the Transportation Fund, Flood Control Fund, and the Lottery Fund, as follows:

| | | |
|---|---|---|
| Transportation | - | $150,000 |
| Flood Control | - | $150,000 |
| State Lottery Fund | - | $150,000 |

Continued funding of the Greenways Program at $450,000 per year is anticipated. Funds are used to pay for the seasonal habitat maintainance crew, Greenways improvement projects and Greenways staff.

Supplementary funding for Greenways projects may be available from a variety of sources. Grants may be available to accomplish stand-alone environmental projects which are currently considered under the Greenways CIP. Historic preservation grants may be available to achieve some of the management goals for cultural resources. Funding may be available from the U.S. Army Corps of Engineers for stream restoration and watershed assessments. Grant applications are coordinated through the City Manager's Office.

## Table 4-1: Current Maintenance Practices

| | FTE's | Inspections | Clean/ Trash | Sweep | Snow Removal | Trees | Mowing | Encroach-ments | Complaints | Flooding/ Underpasses |
|---|---|---|---|---|---|---|---|---|---|---|
| Parks<br><br>Path + 6 ft Either side for Boulder Creek path only | 1 FTE plus .2 seasonals & volun-teers | Formal: 2/year<br>Some documentation<br>Informal: daily | Trash cans emptied daily<br>Litter daily<br>Volunteer programs | 1/week with mech. broom | 4 am - 6 pm or PD request<br>3 passes/shift<br>----------<br>Pickup truck with plow<br>Liquid deicer | Prune: 1/yr and as-needed or by complaint<br>Standard: clearance safety (only branches under 7')<br>Private prop: Prune or coordinate with Forestry for enforcement | Irrigated turf : 1/week<br>6 ft off path<br>Non-irr: 1/mo during summer<br>72" Toro mower | Same as for mowing<br>No edging | 24 hr response time<br>ASAP on hazards | As needed<br>After hrs or PD request close gates<br>Make every attempt to keep underpasses open. Remove sediment and vegetation. |
| Forestry<br><br>Boulder Creek path only | 2.8 % of 1 FTE's time | Formal: Hazard Tree Survey every 7 years for all Greenways paths excluding OSMP areas.<br>Informal: Requests from park staff or residents as concerns arise. | N/A | N/A | N/A | Safety prune & removal for trees on public property as needed.<br>Private property owners notified of their responsibility for necessary action. | N/A | N/A | 24 hour response time; ASAP on hazards. | N/A |
| Bikeways Maint.<br>Path + 6 ft Either side | 3 FTE's | Formal: 2/year<br>Documented<br>Informal: 1/wk | 1/week | Path: as needed<br>Under-passes: 1/wk | 24 hr shifts<br>2-12 hr shifts<br>1 pass/12 hrs<br>----------<br>Plow, liquid deicer, traction when needed | Prune: 1/yr & as needed; complaint driven<br>Safety & clearance std is 8' minimum and limbs back to tree.<br>Private property: notify, prune | Std: < 18" high, 6 ft either side of path<br>Irrigated turf: 1/week<br>Non-irr: as needed, 1/mo (3 to 4 times per season) | As needed<br>Std: if more than 1 ft into path or if safety hazard, remove<br>No edging | 24 hr response time<br>ASAP on hazards | As needed<br>Keep open, or close with gates<br>Open gates ASAP<br>Identify high priority routes to focus efforts |
| Open Space and Mtn Parks[1] | 0 FTE | Formal 1/yr<br>Informal: 2/month by rangers | N/A | N/A | N/A | Prune or remove as needed as part of routine trail maintenance | 1/yr as needed | N/A | 24 hr response time<br>ASAP on hazards | N/A |
| Utilities[1]<br><br>Bank to bank | 0.5 FTE | Formal: 1/yr<br>No doc<br>Informal:<br>On request or after storms | 1/year and upon request<br>Tasks: Trash in creek and sediment removal; Tree/debris removal when restricting flow or on complaint basis | N/A | N/A | N/A | 1/mo (4 times per season)<br>Grass-lined drainageways and above the bank<br><br>Mower with articulated mowing arm | N/A | Next working day (24 hr)<br>ASAP on hazards | Stabilize banks as needed. |

[1] OSMP and the Greenways Program within the City of Boulder Public Works Department employ a seasonal crew to provide habitat maintenance along the Greenways system.

- Weed control is done through mechanical means or with herbicide application.
- Bridge Maintenance: As needed. Formal program involves flipping boards every 10 years and replacing all boards every 20 years.
- Major Maintenance- annual funding of $175,000; work is prioritized by Transportation Project Management and includes concrete remove and replace or grade changes to handle flooding etc.

# APPENDICES

Appendix I: Community and Environmental Assessment Process

Appendix II: Summary of Cultural Resources

Appendix III: Reach Inventories

Appendix IV: Tributary Greenways Guidelines for OSMP lands

Appendix V: Explanation of Changes to Transportation Rankings in Table II-3

Appendix VI: Rankings of Habitat Reaches on Public Properties for Possible Habitat Restoration Projects

Greenways Master Plan Map - Pocket

Maintenance Map - Pocket

**APPENDIX I**
**COMMUNITY AND ENVIRONMENTAL ASSESSMENT PROCESS**

# The Community and Environmental Assessment Process

The Community and Environmental Assessment Process (CEAP) is a formal review process to consider the impacts of public development projects. The CEAP was instituted by City Council in 1987 and is referenced in the Boulder Revised Code (B.R.C. Section 2-1, Appendix IX - Procedure in Handling Major Capital Improvement Projects).

**The purpose of the CEAP is to assess potential impacts of conceptual project alternatives in order to inform the selection and refinement of a preferred alternative.** The CEAP provides the opportunity to balance multiple community goals in the design of a capital project by assessing a project against the policies outlined in the BVCP and departmental master plans. The CEAP allows "fatal flaws" inherent in the concept design of a project to be discovered, thereby suggesting elimination of certain alternatives.

**Guidelines for Identifying Projects that Require the CEAP**

Projects that will require the CEAP review are identified during the annual CIP and budget process. A department first suggests projects that will need to follow the CEAP using the criteria below. The CEAP projects are submitted to the Planning coordinator in Planning and Development Services with the annual CIP and budget. The CEAP Review Group reviews all projects listed in the annual CIP and identifies the appropriate review and approval process for each project. The list is then reviewed by the Planning Board and adopted by the City Council with the budget.

The following list provides a set of criteria for selecting projects that should be evaluated through the CEAP. This list provides general guidance to departments and the CEAP Review Group in identifying CEAP projects. CIP projects that meet at least one of the following criteria would likely benefit from the CEAP.* Projects that do not strictly meet any of the following criteria may require a CEAP as determined by the CEAP Review Group, the Planning Board, or City Council:

1. A project or a potential alternative could have a significant impact on an environmental, social, or cultural resource and the project would benefit from a CEAP.
2. The project is anticipated to generate enough neighborhood or community controversy to require a public hearing or board review.
3. There is more than one possible conceptual alternative that will require staff or community input in the selection.

### Purpose of the CEAP

***Achieve Multiple City Goals***

- Implement the Boulder Valley Comprehensive Plan and Departmental Master Plans.
- Recognize and integrate multiple community goals and interests in single projects.
- Minimize environmental, social, and fiscal impacts of projects.
- Identify opportunities to improve capital projects through project planning and review process.
- Assure internal compliance with city policies, goals, and regulations.

***Achieve Service Efficiency***

- Minimize impacts to other service delivery goals and master plans.
- Achieve efficiency in planning and spending for capital improvements.

***Maintain Effective Public Involvement***

- Effectively manage board, City Council, and public input on project planning and implementation.

4. The project requires alternatives analysis as part of internal or external permitting and review processes at the local, county (1041), state, or federal level (NEPA). (An internal city CEAP should be performed prior to submitting for a local permit or to the external agency.)

***Please note: Projects that require Concept and Site Plan Review do not go through the CEAP and are not reviewed by the CEAP Review Group.***

**CEAP Review**

Once a project is budgeted, the project manager develops alternative concept designs. The project manager then contacts the Planning Coordinator and provides notice of an upcoming CEAP for review. (Notification must be at least 2 weeks in advance of the standing review meeting. CEAP documents must be submitted to the Planning Coordinator at least two weeks prior to the standing review meeting.)

The project manager completes the CEAP documentation (see below) and submits it and the concept plan alternatives to the Planning Coordinator. The Planning Coordinator gives notice of a meeting with the CEAP Review Group and distributes the project documentation to the appropriate staff. The CEAP Review Group meets with the project manager to review the concept plan alternatives and discuss the community and environmental assessment. Staff may either submit written comments to the Planning Coordinator or the Planning Coordinator may take minutes and provide the overall group comments to the project manager. The following questions guide the staff review of the CEAP:

**Important Note!**

**The review and approval of the CEAP by the advisory board should be completed prior to the completion of project engineering and final design documents and prior to board review to insure that staff, board, and public input has been incorporated into the final engineering and design of the project.**

*1. Does staff agree with the impact assessment?*
- *a. Is the analysis complete and accurate?*
- *b. Are there issues that are not identified in the assessment?*
- *c. Are there follow-up questions or issues that need to be addressed?*

*2. Does staff agree with the preferred alternative as identified by the project manager?*
- *a. Are the trade-offs of the preferred alternative acceptable?*
- *b. Are there potential conflicts with other CIP projects?*
- *c. Are there potential regulatory issues that need to be resolved prior to final design and construction?*

*3. Are there anticipated community concerns or public process considerations that should be addressed?*

*4. Is the CEAP ready for board review?*

**CEAP Documentation**

CEAP documentation consists of the following components:
- Project description, location map, and conceptual design graphics;
- Discussion of the BVCP, master plan goals, and subcommunity or area plan implementation that the project will address;
- Description of all alternatives considered and why the proposed alternative was selected;

- Review of the impacts of the project in checklist form;
- Description of the proposed impact mitigation measures and their estimated costs.

The following documents are used for the CEAP.

**1. CEAP Project Background form**

**2. CEAP Checklist**

**3. CEAP Discussion of Impacts** (for impacts identified in the checklist; for example, an analysis of alternatives relative to wetland impacts).

**CEAP Review Roles**

**Department/Project management team:**
- Facilitates planning and design of project.
- Develops and selects proposed project alternatives.
- Completes CEAP evaluation and submits to CEAP Review Group for review.
- Submits CEAP including staff and public input to the advisory board for approval.

**Planning Coordinator:**
- Coordinates the CEAP Review Group.

**CEAP Review Group:**
- Reviews concept plans and CEAPs for consistency with City policies, master plans, and Boulder Revised Code.
- Provides input on balancing City goals and policies in the design of major CIP projects.
- Provides direction to project managers on recommended review processes.
- Identifies potential "red flags" associated with individual projects.

**Departmental Advisory Board:**
- Gives final direction and approval to the department on the CEAP and the preferred conceptual alternative for a project.

**Planning Board:**
- Reviews and comments on Concept Review projects.
- Reviews and approves Site Review projects.
- Gives final direction to the project manager on the CEAP and concept plan for projects from departments with no advisory board (Library, FAM, Fire, Police, HHS).

**City Council:**
- Has call-up option on all advisory board or Planning Board decisions.

**APPENDIX I**
**COMMUNITY AND ENVIRONMENTAL ASSESSMENT PROCESS**

# Review and Approval Process during Project Planning and Design

**Process for Projects that Require Concept and Site Review**

**Step 1:** The project manager completes the requirements for a Concept Plan review and Comment (see Boulder Revised Code, Section 9-4-10 for Concept Plan Review requirements).

**Step 2:** A Concept Plan Review application is submitted to Planning and Development Services (P&DS) on the 1st or 3rd Monday of the month between 8:00 a.m. and 12:00 noon.

**Step 3:** The application is processed by P&DS and assigned to a current planner.

**Step 4:** The Development Review Committee (DRC) reviews the concept plan and issues comments to the project manager.

**Step 5:** The DRC comments are sent to the departmental advisory board for review and recommendation on the concept plan. (Memo is prepared by the project manager.)

**Step 6:** The Planning Board reviews and comments on concept plan. (Memo is prepared by the current planner in P&DS.)

**Step 7:** The DRC comments are forwarded to Council for their comment or call-up option.

**Step 8:** The project manager prepares the Site Review documentation based on the input received during the Concept Plan Review (see Boulder Revised Code, Section 9-4-11 for Site Review requirements).

**Step 9:** A Site Review application is submitted to Planning and Development Services (P&DS) on the 1st or 3rd Monday of the month between 8:00 a.m. and 12:00 noon.

**Step 10:** The application is processed by P&DS and assigned to a current planner.

**Step 11:** The DRC reviews the site plan submittal.

**Review Boards by Project Funding**

**Transportation funded projects:** Transportation Advisory Board public hearing and recommendation

**Parks and Recreation funded projects:** Parks and Recreation Advisory Board public hearing and recommendation.

**Utilities funded projects:** Water Resources Advisory Board public hearing and recommendation.

**Greenways funded projects:** Greenways Advisory Committee public hearing and recommendation.

**Projects within a designated Greenway that are funded by other departments (non-Greenways projects):**
- Non-agenda memo sent to Greenways Advisory Committee and other relevant boards for comment.
- Public hearing and recommendation by advisory board of primary funding department.

**Open Space and Mountain Parks funded projects:** Open Space Board of Trustees public hearing and approval.

**Library, Fire, Police, Facilities and Assets Management, Downtown and University Hill Management, Housing and Human Services, all other departments:** Planning Board public hearing and approval.

**Projects with multiple board interests (includes public works projects on Parks or Open Space lands):** Public hearing and approval by relevant boards in a joint board hearing**.**

**Step 12:** Wetland and floodplain permit applications submitted (concurrent with site review).

**Step 12:** Planning Board reviews the site plan and either approves or does not approve the site plan.

**Step 14:** The site plan and Planning Board decision are forwarded to City Council with a call-up option.

**Step 15:** Project manager finalizes the plans and submits Technical Drawings to P&DS for review (see Phase 4).

**Process for Projects that Require a CEAP**

**Step 1:** The project manager develops preliminary concept plans for project alternatives (project types, locations and function designs).

**Step 2:** The project manager notifies the Planning Coordinator of the project and requests a review by the CEAP Review Group. (Notification to the Planning Coordinator must be at least two weeks in advance of the standing meeting date of the CEAP Review Group.)

**Step 3:** The project manager prepares the following CEAP documentation and submits it to the Planning Coordinator two weeks in advance of the CEAP Review Group scheduled meeting date:

- **CEAP Project Background**
- **CEAP Checklist**
- **CEAP Discussion of Impacts (for impacts identified in the checklist)**

**Step 4:** The CEAP Review Group meets with the project manager to review and discuss the project documentation following the guiding questions outlined under CEAP Review (page 30).

**Step 5:** The Planning Coordinator summarizes the discussion with the CEAP Review Group and forwards the comments to the project manager. The project manager may choose to redesign elements of the project to address major issues raised by staff and re-submit the CEAP for review or move on to the next step in the process.

**Step 6:** The project manager provides public notice of the CEAP and project plans prior to the board hearing (or as determined by the project manager).

**Step 7:** A public hearing is held with the primary advisory board for the department (see sidebar above for a list of boards by project funding). The board reviews the CEAP findings including staff and public comments. The advisory board provides direction to the project manager on further project planning.

a. If the board recommends that the project proceed to Project Engineering and Final Design, the project recommendation and CEAP are forwarded to City Council and subject to City Council call-up.

b. If the board recommends that the concept plan and CEAP findings require major revisions, the project manager may be directed to redesign the project or to provide more detailed analysis of certain impacts and mitigation strategies.

c. If significant project modifications are made, the CEAP is revised and resubmitted to the CEAP Review Group for review. The same process is repeated until the project is accepted in concept by the advisory board.

**Step 8:** The advisory board findings are subject to City Council call-up. If the recommendation by the board is called up, Council holds a public hearing and makes a project approval decision. If Council does not call up the project, then the advisory board direction is final.

**Step 9:** Once both the advisory board and City Council approve project recommendations and the CEAP, the project is ready for Project Engineering and Final Design.

# City Of Boulder
# Community and Environmental Assessment Process

## Cover Sheet:

1. Description and location of the project:

2. Background, purpose and need for the project:

3. Description of project alternatives including:
   - A summary of major issues;
   - Proposed capital and on-going operating costs;
   - Property acquisition;
   - Permits anticipated to be needed as project design becomes more refined (i.e. wetlands, 1041, stormwater discharge)

4. Preferred project alternative:

5. Public input to date:

6. Staff project manager:

7. Other consultants or relevant contacts:

---

## Goals Assessment:

1. Using the BVCP and department master plans, describe the primary City goals and benefits that the project will help to achieve:

   a. Community Sustainability Goals – How does the project improve the quality of economic, environmental and social health with future generations in mind?
   b. BVCP Goals related to:
      - Community Design
      - Facilities and Services
      - Environment
      - Economy
      - Transportation
      - Housing
      - Social Concerns and Human Services
   c. Describe any regional goals (potential benefits or impacts to regional systems or plans?)

2. Is this project referenced in a master plan, subcommunity or area plan? If so, what is the context in terms of goals, objectives, larger system plans, etc.? If not, why not?

3. Will this project be in conflict with the goals or policies in any departmental master plan and what are the tradeoffs among City policies and goals in the proposed project alternative? (e.g. higher financial investment to gain better long-term services or fewer environmental impacts)

4. List other City projects in the project area that are listed in a departmental master plan or the CIP.

5. What are the major city, state, and federal standards that will apply to the proposed project? How will the project exceed city, state, or federal standards and regulations (e.g. environmental, health, safety, or transportation standards)?

6. Are there cumulative impacts to any resources from this and other projects that need to be recognized and mitigated?

**Impact Assessment:**

1. Using the attached checklist, identify the potential short or long-term impacts of the project alternatives.

Use +, - or 0 in the checklist table to indicate impacts, benefits and no changes for each alternative.
+ indicates a positive effect or improved condition
- indicates a negative effect or impact
0 indicates no effect

Categories on the Checklist Table indicating positive or negative impacts (+ or –) should answer the Checklist Questions following the table in full.

**APPENDIX I**
**COMMUNITY AND ENVIRONMENTAL ASSESSMENT PROCESS**

## Checklist

+ **Positive effect**
- **Negative effect**
**0** **No effect**

| **Project Title:** | **Preferred Alternative** | **Alternative 2** | **Alternative 3** |
|---|---|---|---|
| **A. Natural Areas or Features** | | | |
| 1. Disturbance to species, communities, habitat, or ecosystems due to: | | | |
| **a. Construction activities** | | | |
| **b. Native vegetation removal** | | | |
| **c. Human or domestic animal encroachment** | | | |
| **d. Chemicals (including petroleum products, fertilizers, pesticides, herbicides)** | | | |
| **e. Behavioral displacement of wildlife species (due to noise from use activities)** | | | |
| **f. Habitat removal** | | | |
| **g. Introduction of non-native plant species in the site landscaping** | | | |
| **h. Changes to groundwater or surface runoff** | | | |
| **i. Wind erosion** | | | |
| **2. Loss of mature trees or significant plants?** | | | |
| **B. Riparian Areas/Floodplains** | | | |
| **1. Encroachment upon the 100-year, conveyance ore high hazard flood zones?** | | | |
| **2. Disturbance to or fragmentation of a riparian corridor?** | | | |
| **C. Wetlands** | | | |
| **1. Disturbance to or loss of a wetland on site?** | | | |

**APPENDIX I**
**COMMUNITY AND ENVIRONMENTAL ASSESSMENT PROCESS**

| **Project Title:** | | | **Preferred Alternative** | **Alternative 2** | **Alternative 3** |
|---|---|---|---|---|---|
| **D.** | **Geology and Soils** | | | | |
| **1.** | **a.** | **Impacts to unique geologic or physical features?** | | | |
| | **b.** | **Geologic development constraints?** | | | |
| | **c.** | **Substantial changes in topography?** | | | |
| | **d.** | **Changes in soil or fill material on the site?** | | | |
| | **e.** | **Phasing of earth work?** | | | |
| **E.** | **Water Quality** | | | | |
| **1.** | **Impacts to water quality from any of the following?** | | | | |
| | **a.** | **Clearing, excavation, grading or other construction activities** | | | |
| | **b.** | **Change in hardscape** | | | |
| | **c.** | **Change in site ground features** | | | |
| | **d.** | **Change in storm drainage** | | | |
| | **e.** | **Change in vegetation** | | | |
| | **f.** | **Change in pedestrian and vehicle traffic** | | | |
| | **g.** | **Pollutants** | | | |
| **2.** | **Exposure of groundwater contamination from excavation or pumping?** | | | | |
| **F.** | **Air Quality** | | | | |
| **1.** | **Short or long term impacts to air quality ($CO_2$ emissions, pollutants)?** | | | | |
| | **a.** | **From mobile sources?** | | | |
| | **b.** | **From stationary sources?** | | | |
| **G.** | **Resource Conservation** | | | | |
| **1.** | **Changes in water use?** | | | | |
| **2.** | **Increases or decreases in energy use?** | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| 3. | Generation of excess waste? | | | | | |
| **Project Title:** | | | | | Preferred Alternative | Alternative 2 | Alternative 3 |
| **H.** | **Cultural/Historic Resources** | | | | | | |
| 1. | a. | Impacts to a prehistoric or archaeological site? | | | | | |
| | b. | Impacts to a building or structure over fifty years of age? | | | | | |
| | c. | Impacts to a historic feature of the site? | | | | | |
| | d. | Impacts to significant agricultural land? | | | | | |
| **I.** | **Visual Quality** | | | | | | |
| 1. | a. | Effects on scenic vistas or public views? | | | | | |
| | b. | Effects on the aesthetics of a site open to public view? | | | | | |
| | c. | Effects on views to unique geologic or physical features? | | | | | |
| | d. | Changes in lighting? | | | | | |
| **J.** | **Safety** | | | | | | |
| 1. | Health hazards, odors, or radon? | | | | | | |
| 2. | Disposal of hazardous materials? | | | | | | |
| 3. | Site hazards? | | | | | | |
| **K.** | **Physiological Well-being** | | | | | | |
| 1. | Exposure to excessive noise? | | | | | | |
| 2. | Excessive light or glare? | | | | | | |
| 3. | Increase in vibrations? | | | | | | |
| **L.** | **Services** | | | | | | |
| 1. | Additional need for: | | | | | | |
| | a. | Water or sanitary sewer services? | | | | | |
| | b. | Storm sewer/Flood control features? | | | | | |

| | | | | |
|---|---|---|---|---|
| | c. Maintenance of pipes, culverts and manholes? | | | |
| | d. Police services? | | | |
| | e. Fire protection services? | | | |
| | f. Recreation or parks facilities? | | | |
| | g. Library services? | | | |
| | h. Transportation improvements/traffic mitigation? | | | |
| | i. Parking? | | | |
| | j. Affordable housing? | | | |
| | k. Open space/urban open land? | | | |
| | l. Power or energy use? | | | |
| | m. Telecommunications? | | | |
| | n. Health care/social services? | | | |
| | o. Trash removal or recycling services? | | | |
| **M.** | **Special Populations** | | | |
| 1. | Effects on: | | | |
| | a. Persons with disabilities? | | | |
| | b. Senior population? | | | |
| | c. Children or youth? | | | |
| | d. Restricted income persons? | | | |
| | e. People of diverse backgrounds (including Latino and other immigrants)? | | | |
| | f Neighborhoods? | | | |
| | g. Sensitive populations located near the project (e.g. schools, hospitals, nursing homes)? | | | |
| **N.** | **Economy** | | | |
| 1. | Utilization of existing infrastructure? | | | |
| 2. | Effect on operating expenses? | | | |
| 3. | Effect on economic activity? | | | |
| 4. | Impacts to businesses, employment, retail sales or City revenue? | | | |

**APPENDIX I**
**COMMUNITY AND ENVIRONMENTAL ASSESSMENT PROCESS**

## Checklist Questions

*Note: The following questions are a supplement to the CEAP checklist. Only those questions indicated on the checklist are to be answered in full.*

### A. Natural Areas and Features

1. Describe the potential for disturbance to or loss of significant: species, plant communities, wildlife habitats, or ecosystems via any of the activities listed below. (Significant species include any species listed or proposed to be listed as rare, threatened or endangered on federal, state, county lists.)
    a. Construction activities
    b. Native Vegetation removal
    c. Human or domestic animal encroachment
    d. Chemicals to be stored or used on the site (including petroleum products, fertilizers, pesticides, herbicides)
    e. Behavioral displacement of wildlife species (due to noise from use activities)
    f. Introduction of non-native plant species in the site landscaping
    g. Changes to groundwater (including installation of sump pumps) or surface runoff (storm drainage, natural stream) on the site
    h. Potential for discharge of sediment to any body of water either short term (construction-related) or long term
    i. Potential for wind erosion and transport of dust and sediment from the site

2. Describe the potential for disturbance to or loss of mature trees or significant plants.

**If potential impacts have been identified, please provide any of the following information that is relevant to the project:**

- A description of how the proposed project would avoid, minimize, or mitigate identified impacts.
- A habitat assessment of the site, including: 1. a list of plant and animal species and plant communities of special concern found on the site; 2. a wildlife habitat evaluation of the site.
- Maps of the site showing the location of any Boulder Valley Natural Ecosystem, Boulder County Environmental Conservation Area, or critical wildlife habitat.

### 4.2.1.1.1.1.1.1.1 B. Riparian Areas and Floodplains

1. Describe the extent to which the project will encroach upon the 100-year, conveyance or high hazard flood zones.

2. Describe the extent to which the project will encroach upon, disturb, or fragment a riparian corridor: (This includes impacts to the existing channel of flow, stream banks, adjacent riparian zone extending 50 ft. out from each bank, and any existing drainage from the site to a creek or stream.)

**If potential impacts have been identified, please provide any of the following information that is relevant to the project:**

- A description of how the proposed project would avoid, minimize, or mitigate identified impacts to habitat, vegetation, aquatic life, or water quality.
- A map showing the location of any streams, ditches and other water bodies on or near the project site.
- A map showing the location of the 100-year flood, conveyance, and high hazard flood zones relative to the project site.

#### 4.2.1.1.1.1.1.2 C. Wetlands

1. Describe any disturbance to or loss of a wetland on site that may result from the project.

**If potential impacts have been identified, please provide any of the following information that is relevant to the project:**

- A description of how the proposed project would avoid, minimize, or mitigate identified impacts.
- A map showing the location of any wetlands on or near the site. Identify both those wetlands and buffer areas which are jurisdictional under City code (on the wetlands map in our ordinance) and other wetlands pursuant to federal criteria (definitional).

#### 4.2.1.1.1.1.1.3 D. Geology and Soils

1. Describe any:
    a. impacts to unique geologic or physical features;
    b. geologic development constraints or effects to earth conditions or landslide, erosion, or subsidence;
    c. substantial changes in topography; or
    d. changes in soil or fill material on the site that may result from the project.

**If potential impacts have been identified, please provide the following:**

- A description of how the proposed project would avoid, minimize, or mitigate identified impacts.
- A map showing the location of any unique geologic or physical features, or hazardous soil or geologic conditions on the site.

#### 4.2.1.1.1.1.1.4 E. Water Quality

1. Describe any impacts to water quality that may result from any of the following:
    a. Clearing, excavation, grading or other construction activities that will be involved with the project;
    b. Changes in the amount of hardscape (paving, cement, brick, or buildings) in the project area;
    c. Permanent changes in site ground features such as paved areas or changes in topography;
    d. Changes in the storm drainage from the site after project completion;
    e. Change in vegetation;
    f. Change in pedestrian and vehicle traffic;
    g. Potential pollution sources during and after construction (may include temporary or permanent use or storage of petroleum products, fertilizers, pesticides, or herbicides).

2. Describe any pumping of groundwater that may be anticipated either during construction or as a result of the project. If excavation or pumping is planned, what is known about groundwater contamination in the surrounding area (1/4 mile in all directions from the project) and the direction of groundwater flow?

**If potential impacts have been identified, please provide any of the following that is relevant to the project:**

- A description of how the proposed project would avoid, minimize, or mitigate impacts to water quality.
- Information from city water quality files and other sources (state oil inspector or the CDPHE) on sites with soil and groundwater impacts within 1/4 mile radius of project or site.
- If impacts to site are possible, either from past activities at site or from adjacent sites, perform a Phase I Environmental Impact Assessment prior to further design of the project.
- Groundwater levels from borings or temporary peizometers prior to proposed dewatering or installation of drainage structures.

## F. Air Quality

1. Describe potential short or long term impacts to air quality resulting from this project. Distinguish between impacts from mobile sources (VMT/trips) and stationary sources (APEN, HAPS).

## G. Resource Conservation

1. Describe potential changes in water use that may result from the project.
    a. Estimate the indoor, outdoor (irrigation) and total daily water use for the facility.
    b. Describe plans for minimizing water use on the site (Xeriscape landscaping, efficient irrigation system).

2. Describe potential increases or decreases in energy use that may result from the project.
    a. Describe plans for minimizing energy use on the project or how energy conservation measures will be incorporated into the building design.
    b. Describe plans for using renewable energy sources on the project or how renewable energy sources will be incorporated into the building design.
    c. Describe how the project will be built to LEED standards.

3. Describe the potential for excess waste generation resulting from the project.
   If potential impacts to waste generation have been identified, please describe plans for recycling and waste minimization (deconstruction, reuse, recycling, green points).

## H. Cultural/Historic Resources

1. Describe any impacts to:
    a. a prehistoric or historic archaeological site;
    b. a building or structure over fifty years of age;
    c. a historic feature of the site such as an irrigation ditch;
    d. significant agricultural lands that may result from the project.

**If potential impacts have been identified, please provide the following:**

- A description of how the proposed project would avoid, minimize, or mitigate identified impacts.

### 4.2.1.1.1.1.1.5 I. Visual Quality

1. Describe any effects on:
    a. scenic vistas or views open to the public;
    b. the aesthetics of a site open to public view; or
    c. view corridors from the site to unique geologic or physical features that may result from the project.

### 4.2.1.1.1.1.1.6 J. Safety

1. Describe any additional health hazards, odors, or exposure of people to radon that may result from the project.

2. Describe measures for the disposal of hazardous materials.

3. Describe any additional hazards that may result from the project. (Including risk of explosion or the release of hazardous substances such as oil, pesticides, chemicals or radiation)

**If potential impacts have been identified, please provide the following:**

- A description of how the proposed project would avoid, minimize, or mitigate identified impacts during or after site construction through management of hazardous materials or application of safety precautions.

### 4.2.1.1.1.1.1.7 K. Physiological Well-being

1. Describe the potential for exposure of people to excessive noise, light or glare caused by any phase of the project (construction or operations).

2. Describe any increase in vibrations or odor that may result from the project.

**If potential impacts have been identified, please provide the following:**

- A description of how the proposed project would avoid, minimize, or mitigate identified impacts.

### 4.2.1.1.1.1.1.8 L. Services

*1. Describe any increased need for the following services as a result of the project:*

a. Water or sanitary sewer services
b. Storm sewer / Flood control features
c. Maintenance of pipes, culverts and manholes
d. Police services
e. Fire protection
f. Recreation or parks facilities
g. Libraries
h. Transportation improvements/traffic mitigation

i. Parking
j. Affordable housing
k. Open space/urban open land
l. Power or energy use
m. Telecommunications
n. Health care/social services
o. Trash removal or recycling services

2. Describe any impacts to any of the above existing or planned city services or department master plans as a result of this project. (e.g. budget, available parking, planned use of the site, public access, automobile/pedestrian conflicts, views)

### 4.2.1.1.1.1.1.1.9 M. Special Populations

1. Describe any effects the project may have on the following special populations:
    a. Persons with disabilities
    b. Senior population
    c. Children or Youth
    d. Restricted income persons
    e. People of diverse backgrounds (including Latino and other immigrants)
    f. Sensitive Populations located near the project (e.g. adjacent neighborhoods or property owners, schools, hospitals, nursing homes)

**If potential impacts have been identified, please provide the following:**

- A description of how the proposed project would avoid, minimize, or mitigate identified impact.
- A description of how the proposed project would benefit special populations.

## N. Economic Vitality

1. Describe how the project will enhance economic activity in the city or region or generate economic opportunities?

2. Describe any potential impacts to:
    a. businesses in the vicinity of the project (ROW, access or parking),
    b. employment,
    c. retail sales or city revenue and how they might be mitigated.

**APPENDIX II**
**SUMMARY OF CULTURAL RESOURCES**

## PREHISTORIC AND HISTORIC BACKGROUND OF THE GREENWAYS SYSTEM

### Aboriginal History

Aboriginal groups are known to have occupied northeastern Colorado since at least 11,500 years ago. A number of Stages and Periods have been defined to describe prehistoric culture history. Occupation of the Front Range during the Plano Period (ca. 10,000-7500 BP) has been demonstrated, but earlier occupation is evidenced only by isolated Clovis and Folsom projectile points.

Human use and occupation of the plains/foothills transition zone, including Boulder Valley, during subsequent periods was not continuous but was substantial over the last 5000 years, particularly during the last 2000 years.

The Comanche and Ute occupied Colorado during the 18th century, with the Comanche controlling the plains, and the Ute in the foothills and mountains.

By the early 19th century, the Cheyenne and Arapaho began to occupy most of the plains of eastern Colorado (Buckles 1968). Both of these tribes were semi-nomadic, depending primarily on the hunting of bison and other large game animals. The Arapaho also utilized the Front Range, and the Boulder Valley was a winter campsite. In the Treaty of Fort Laramie (1851) a vast area of land was assigned to the Cheyenne and Arapaho as a reservation, including all of Colorado east of the Continental Divide and north of the Arkansas River. Ten years later, however, the Treaty of Fort Wise was signed, requiring their removal from all lands in the earlier treaty except for a small reservation in east-central Colorado (Berthrong 1963). This left Boulder County open for European settlement.

### Historic Settlement and Development

In 1858, gold was discovered at the confluence of Cherry Creek and the South Platte River. News of the gold strike in the "Pike's Peak" region quickly spread and a gold rush began (Hafen 1941; Wolle 1949). Precious metal mining became a dominant enterprise in the Colorado Rockies, with periodic mining booms occurring into the first decades of the 20th century.

The first pioneers to settle in Boulder arrived in November, 1858 (Meier 1993). Prospecting for gold in the mountains began soon after and several mining districts were defined. Mining camps and towns developed with cycles of boom and bust mining occurring in Boulder County for the next 60+ years.

The initial gold rush and subsequent mining booms attracted more people to the area than could be supported by mining. Those who did not find their fortune in gold or tungsten sought it elsewhere or through other means. The mining booms created the need for other industry, particularly agricultural endeavors to supply meat and produce. Many who could not afford agricultural land elsewhere would take advantage of the passage of the Homestead Act of 1862 and later, the Timber Culture Law of 1873. Settlement of the Boulder Valley and adjacent foothills ensued rapidly by people engaged in farming or ranching.

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Development of water resources also occurred to provide water for agricultural pursuits. The local creeks flowing out of the mountains were tapped by irrigation ditches, starting soon after settlement of the Boulder Valley.
Transportation to and from the mining districts and between communities on the plains was provided by wagon and stagecoach. The railroad reached Boulder in 1873. In the 1880s and 1890s the "Switzerland Trail" railroad was constructed and served the mountain communities. The Denver & Interurban carried passengers between Denver and Boulder until the late 1920s.

The railroads greatly spurred the growth of Boulder, and facilitated mining and extractive industries, both of hard rock ores from the mountains and coal and oil from the Boulder Valley.

The first schoolhouse in Colorado Territory was built in Boulder in 1860 (Dyni 1991). Public schools were continually established as the population of Boulder grew. Construction of the University of Colorado was underway by 1875 and the University has been and continues to be a major feature of Boulder.

Chautauqua was established in 1898 and tourism and recreation became important aspects of Boulder and remain so.

Themes which are relevant to the Greenways study area are thus:

- Aboriginal History, ca. 10,000 B.C. to A.D. 1880
- Mining and Extractive Industries, ca. 1858 to present
- Agriculture, ca. 1859 to present
- Urban Residential Neighborhoods, ca. 1858 to present
- Water Resources, ca. 1859 to present
- Transportation, ca. 1859 to present
- Education, ca. 1860 to present
- Recreation & Sports, ca. 1859 to present

## The Boulder Creek Corridor

The majority of the cultural properties along the Greenways are along Boulder Creek in Reach 6 and 7. Reach 7, extending from Eben G. Fine Park to just east of Boulder High School, has a particularly interesting history.

The railroad played a major role in development of Boulder Creek. Central Park was known as Railroad Park during the 19th century and was owned by railroads. The railroad up Boulder Canyon brought ore to town from the mines to the west. A switch spur came off Canyon Blvd (then Water Street) in the area of the current "Butterfly Garden" west of 6th St. (see photo in Schoolland 1967:213), and railroad workers lived in a house there.

A number of mills and smelters were present along Boulder Creek from 9th St. west, including the Boyd Smelter (built 1874); Delano Chlorination Mill, later called the Atlas Mill; the Preston Mill west of 9th St. at the current Charles A. Haertling sculpture garden; the Marshall Mill; and the Yount Flour Mill (pertaining to agriculture, not mining).

Industrial use was not limited to the 19th century. In 1909, the Colorado Vanadium Company rented the old Preston Mill to extract vanadium from roscoelite. In 1918, the Vanadium Alloys Steel Co. of Pennsylvania rebuilt the Boyd Smelter. Around World War I, Warren Bleecker began using the Preston Mill for his Tungsten Products Co., but then bought the Lucky Two Mill at Pearl and Canyon and used it to concentrate tungsten. After the collapse of the tungsten industry, Bleecker formed the Radium Company of Colorado to process vanadium and radium. In 1921, Bleecker formed a new company and bought a vacant tungsten refinery on the south bank of Boulder Creek at 3rd and Arapahoe. The laboratory manufactured luminous paint (using radium) and time-bombs for use in oil wells to fracture oil bearing rock. The Bleecker "bomb factory," as it was locally known, burned down on June 26, 1925. Bleecker rebuilt his lab, but in 1928 he became a politician (Meier 1994).

A standard gauge rail crossed Boulder Creek west of Broadway near the current pedestrian bridge. To the west, all rail crossings were narrow gauge. The Earnest Grill Lumber yard was on the south side of the creek, west of 12th St., between the creek and Arapahoe. The McAlister Lumber yard, abandoned in the 1920s, was north of the tracks near 6th St.

Sand pits were present on both sides of the creek from the mouth of Boulder Canyon to at least 9th St. to capture sediment from Boulder Creek. A Conoco gas bulk plant was at the end of 3rd St. west of the current Justice Center.

The current Justice Center was a flat meadow where Gypsies camped with horses and wagons during the 1920s. Later, during the early 1930s, the Civilian Conservation Corps camp SP-2-C was there. Hobos camped along the creek. A softball park was present to the east of 6th St. The free auto camp where Eben G. Fine Park is now located opened in 1921.

The area between the current municipal building and library was known as "Bugtown" or “The Jungle." It was a shanty town which housed Boulder's red light district, low income and unemployed residents during the first three decades of the 20th century. In March, 1927, the City announced it would clear the area and "improve" it in line with the Olmsted Plan for Boulder Creek. People were ordered to vacate the area (see photo in Meier 1994:188).

### 4.2.1.1.1.1.2 SIGNIFICANCE OF CULTURAL SITES

**4.2.1.1.1.1.3 The significance of historic and archaeological sites is assessed through determining their eligibility for inclusion under one or more classifications or designations. National Register of Historic Places (NRHP) eligibility is judged according the criteria set forth in 36CFR 60.4 below:**

"National Register Criteria" means the following criteria, established by the Secretary of the Interior for the use in evaluating and determining the eligibility of properties for listing in the National Register:

The quality of significance in American history, architecture, archaeology, engineering and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, association and:

(A) That are associated with events that have made a significant contribution to the broad patterns of our history

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(B) That are associated with the lives of persons significant in our past
(C) That embody the distinctive characteristics of a type, period or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction
(D) That have yielded, or may be likely to yield, information important in prehistory of history.

The State Register of Historic Properties (SRHP) uses essentially the same criteria as above with the addition of a fifth criterion, "geographical importance". All properties eligible to the NRHP are eligible to the SRHP.

Cultural properties which are not eligible to the NRHP or SRHP may be eligible for local land marking under Cty of Boulder regulations. Boulder enacted a Historic Preservation Ordinance in 1974, for the purpose of "protecting, enhancing, and perpetuating buildings, sites, and areas of the City reminiscent of past eras, events, and persons important in local, state and national history or providing significant examples of architectural styles of the past."

For management purposes, cultural sites that are eligible for any historic designation should usually receive additional attention prior to modification, disturbance or demolition. Mitigation programs are site-specific and may include, among other things, thorough documentation, excavation, or preservation.

Specific management strategies that have been recommended for Boulder Greenways sites include:

- Significant cultural properties should be actively preserved and maintained, whether or not they have been listed on the NRHP or Land marked.
- Cultural properties which are owned by the City, such as Eben G. Fine and Central Parks, should have preservation of their historical integrity as a priority. The archaeological sites such as the Boyd Smelter and City Dump at Scott Carpenter Park should be protected from looting. Any new trail construction or alteration or any earth disturbing activity near these sites should be monitored by an archaeologist to insure remains are not destroyed.
- While ditches and railroads have their own legally protected rights-of-way, the owners should be encouraged to maintain the properties in their historical condition whenever possible.
- The Boulder Valley School District and the University of Colorado should be encouraged to maintain the field buildings at the High School (several of which are not currently used) and the CCC stonework near the High School and on CU property. Some of the stone walls and terraces at CU are in need of repair.
- Interpretive signs and/or brochures discussing specific cultural resources and general historical data can be useful and informative to the public. Interpretive signs can be placed anywhere a cultural property is encountered along a Greenway.

However, the most appropriate location for historical interpretation is along Boulder Creek, Reach 7 - from Eben G. Fine Park to 9th Street or to Broadway. The considerable and fascinating history of this area has been summarized above. While some of the history does not have extant cultural manifestations, it can still be readily demonstrated with historical photos. This would also provide some continuity with the interpretive signs done by Boulder County for the Pioneer Trail which extends west up Boulder Canyon from Eben G. Fine Park.

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## 4.2.1.1.1.1.4 CULTURAL SITES LOCATED WITHIN THE GREENWAYS SYSTEM

**Stream Reach**: Fourmile Canyon Creek 3
**Site Number**: 5BL6632 - Farmers Ditch
**Background**: Site **5BL6632** is the **Farmers Ditch**. Its head gate is on the north side of Boulder Creek, near Pearl Street. The ditch flows north through the Mapleton Hill area, then northeast through the Boulder Valley Ranch before ending at 55th street and dispersing any remaining water to the Boulder Reservoir basin. The bridges and tunnel of that ditch section through the city of Boulder are fairly well documented in the Carnegie Branch Library for Local History in Boulder.

The Farmers Ditch was built circa 1862 at a cost of $5500 (Tourtellote & Thomas 1862b). Its priority number is 14, with a date of fee appropriation of October 1, 1862 for 3000 acre-feet of water (Dyni 1989). Originally, during the ditch's inception, Jonathan A. Tourtellote and Jerome Thomas were the Farmers Ditch Company directors (Tourtellote & Thomas 1862a), the former also being the treasurer and the latter the secretary (Tourtellote & Thomas 1862b). Jonathan A. Tourtellote, the primary signer of the Farmers Ditch Company Documents to the Boulder County Board of Commissioners, was a Boulder merchant. Arriving to Boulder in 1860, he and his brother-in-law bought a log building at 11th and Pearl Streets, founding "Tourtellote & Squires," a general store, hotel and boarding house. Tourtellote and company operated this business until 1865, also buying real estate. Tourtellote and Squires soon resumed shop, dealing in the lumber, mercantile and mining businesses, in which Tourtellote stayed until his death in 1871. His son carried the business on. Historically, the ditch was one of those owned by James P. Maxwell, and in 1873, his Boulder Aqueduct Company was allowed by the city to run a wooden-pipe waterworks along primary streets (Smith 1986). It powered the Yount-McKenzie Flour Mill. The ditch also fed Wolff's orchard or "Rattlesnake Ranch" on the east side of Broadway and, during World War I, the Mapleton School children's victory garden, before reaching the North Boulder Valley.

**Notes:** There are four aerial crossings of the creek by pipes carrying water from 5BL3813, The Silver Lake Ditch. These are feeders from a lateral of the ditch, and while the Silver Lake Ditch is significant, feeder ditches are not considered significant elements of the ditch. These are between 19th and 26th streets.

A variety of creek bank treatments are present between 19th and 26th streets, including stacked cobbles, stones in cement, and concrete. These bank treatments are only in a few places, and none appear to be very old.

**Significance:** Unaltered segments of the Farmers Ditch are eligible for nomination to the NRHP for their association with the development of Water Storage and Irrigation.

**Stream Reach:** Fourmile Canyon Creek 5
**Site Number:** 5BL3813 - Silver Lake Ditch
**Background:** Site **5BL3813** is the **Silver Lake Ditch**. The head gate for the ditch is on the north side of Boulder Creek, slightly west of the rock formation known as Lover's Leap. The ditch flows down the side of the canyon in a metal flume which replaced an original wooden flume; the ditch then routes north of Settlers Park and around the mouth of Sunshine Canyon. It flows north along the Dakota Ridge to Wonderland Lake, and northeast to Mesa Reservoir.

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The ditch was constructed by J.P. Maxwell and George Oliver, and has an appropriation date of February 28, 1888, with an appropriation of 20 cubic feet per second from Boulder Creek. The ditch was constructed to irrigate 1000 acres and to provide storage of water in Mesa Reservoir. Mesa Reservoir has a decree date of 1893. The ditch also was used to supply water to Mesa Park Reservoir (Wonderland Lake), constructed somewhat later, around 1905. Other features of this water transport and storage system are Silver Lake Reservoir and Island Lake Reservoir, built in the high country to supply water to the ditch. These two reservoirs were sold to the city in 1906. The ditch was sold by Maxwell and Oliver in 1907, and has an adjudication date of March 13, 1907. There have been other appropriations and abandonments of water for the ditch between 1900 and 1988.

**Significance:** Unaltered segments of the Silver Lake Ditch are eligible for nomination to the NRHP for their association with the development of Water Storage and Irrigation.

**Stream Reach:** Wonderland Creek 4/5
**Site Number:** 5BL6632- Farmers Ditch
**Background:** See Fourmile Canyon Creek Reach 3
**Significance:** See Fourmile Canyon Creek Reach 3

**Stream Reach:** Wonderland Creek 8
**Site Number:** 5BL3814 - Wonderland Lake; 5 BL3815 - Degge Fish Rearing Complex
**Background:** Wonderland Lake was originally known as Mesa Park Reservoir and, according to Everett Long, was constructed by J.P. Maxwell and C.M. Tyler around 1905. The first adjudication on file at the Water Records, State Engineers Office, was April 10, 1905, with W.R. Rathbon as the claimant. The lake was sold to Dudly A. Degge in 1907, with an appropriation date of February 7, 1907, and an adjudication date of November 3, 1909. The decreed amount is 1219.42 acre-feet. The reservoir has been colloquially known as West Degge Lake or Little Degge Lake, and Mesa Reservoir was known as East Degge Lake or Big Degge Lake. Drumm's Pocket Map of Boulder County for 1925 still has it as Mesa Park Reservoir, and that is the name used in the State Water Records. Degge reportedly wanted the lake and vicinity for land development, to attract housing to the vicinity, but housing development around the lake did not occur until many years later. Informants recall sneaking into the lake to swim, a challenging adventure because Dudley Degge used to sit in his car parked near the lake and guard the lake. Informants also recall the lake freezing hard enough in winter to sail ice boats on. The lake currently covers about 25 acres. When the lake was acquired by Open Space, the dam was found to be unsafe and was extensively rebuilt.

The **Degge Fish Rearing Complex**. Several historic features were found to the east of Wonderland Lake. These consisted of two small dams and a fish hatchery, and concrete pads apparently from small structures. All of these features were probably constructed by Dudley A. Degge, the owner of the lake. The dams were probably related to ponds that Degge built for rearing black bass. The venture was at least partially commercial, as he furnished bass to stock lakes in the Hygiene area. The fish rearing operation was constructed prior to the 1920's, perhaps before World War 1 (W.W. Degge Jr., personal communication to D.M. Teegarden).

**Significance:** Sites which are not individually eligible to the NRHP may be eligible as elements of districts. They are also eligible to the SRHP or for City Land marking. This would include Wonderland Lake (**5BL3814**).

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**Stream Reach:** Goose Creek 3
**Site Number:** 5BL5820 - Boulder and Left Hand Ditch; 5BL6879 - North Boulder Farmers Ditch
**Background: 5BL5820** is the **Boulder and Left Hand Ditch.** It shares a head gate on Boulder Creek in Central Park with the adjacent North Boulder Farmers Ditch (**5BL6879**), and Boulder and White Rock Ditch (**5BL859**). The Boulder and Left Hand Ditch has a decree date of December 1, 1873 for 82.8 cubic feet per second with a priority number of 36 for water from Boulder Creek. It was enlarged April 1, 1876, with an appropriation of another 81 cfs and an adjudication date of May 2, 1882. It has a physical capacity of 35 cfs. It is a bermed, U-shaped ditch, four meters wide and two to three meters deep. In places it has been altered to flow though a modern concrete channel.

**5BL6879** is the **North Boulder Farmers Ditch**. The ditch shares the head gate on Boulder Creek in Central Park with the Boulder White Rock Ditch (**5BL859**) and the Boulder Left Hand Ditch (**5BL5820**). It is roughly parallel and south of the adjacent Boulder and Left Hand Ditch. It is a bermed, U-shaped ditch, four meters wide and two to three meters deep. In places it has been altered to flow though a modern concrete channel. The North Boulder Farmers Ditch has a date of decree of 1862, with a priority number of 11 for water from Boulder Creek, with an appropriation of 10.78 cfs of water. It was first enlarged in 1863 for 65.25 cfs, with both appropriations adjudicated on June 2, 1882. The physical capacity of the ditch is 48 cfs.

**Significance:** Unaltered sections of the Boulder and Left Hand Ditch and the North Boulder Farmers Ditch are eligible for nomination to the NRHP for their association with the development of Water Storage and Irrigation.

**Stream Reach**: Goose Creek 4
**Site Number:** 5BL400 - Colorado & Southern Railroad
**Background: 5BL400** is the **Colorado & Southern Railroad**. Rail services arrived in southeastern Boulder County during the period of early settlement. In 1872-1873, the Colorado Central Railroad laid tracks to Longmont and then to a connection with the Union Pacific near Greeley. During the late 1880s, the Colorado Central merged into the Union Pacific system. Later, after UP receivership, the old Colorado Central became the core of the newly created Colorado & Southern Railroad. The Colorado & Southern then became a subsidiary of the Chicago, Burlington & Quincy until the early 1970s when the Burlington Northern was created.

**Significance:** The C&S Railroad is eligible for nomination to the NRHP for its historic association with the development of Transportation.

**Stream Reach:** Goose Creek 5
**Site Number:** 5BL859 - Boulder & White Rock Ditch
**Background: 5BL859** is the **Boulder & White Rock Ditch.** The Boulder & White Rock Ditch shares a head gate on Boulder Creek in Central Park with the North Boulder Farmers Ditch (**5BL6879**) and the Boulder Left Hand Ditch (**5BL5820**). The Boulder & White Rock Ditch Co. was incorporated January, 1871 by Alpheus Wright, Granville Berkley and his two sons (Granville Jr. and Junius), Samuel Hayden, and Thomas Graham. The ditch was constructed in 1872 to provide irrigation to farms north of Boulder. It has an appropriation date of November 1, 1873 for 135 cfs, with an adjudication date of June 2, 1882. An appropriation of 26 cfs from Goose Creek on December 1, 1873 was adjudicated May 5, 1892. The State Engineer lists the physical capacity of the ditch at 100 cfs. The ditch averages 20 feet in width and reaches 15 to 20 feet in depth.

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**Significance:** Unaltered portions of the Boulder & White Rock Ditch are eligible for nomination to the NRHP for their association with the development of Water Storage and Irrigation.

**Stream Reach:** Boulder Creek 2
**Site Number:** 5BL400 - Colorado & Southern Railroad
**Background:** See Goose Creek 4
**Significance:** The C&S Railroad is eligible for nomination to the NRHP for its association with the development of Transportation.

**Stream Reach:** Boulder Creek 5
**Site Numbers:** 5BL8820 - City Dump; 5BL8819 - Wellman Ditch
**Background: 5BL8820** is the **City Dump** which is under Scott Carpenter Park.
The former city dump still exists under the sod at the park. Shards of glass and ceramics are visible along the path near the creek, and complete bottles were recovered during construction of the current path. The horizontal and vertical extents of the dump deposits are unknown.

In 1895, the city raised 25,000 to buy land at the eastern city limits and establish a dump and sewage settling basin. A sewer main brought waste material to the basin where it sat until being expelled into Boulder Creek. Additional sewer lines were added over time, and by 1920 much of the city was serviced by sewers. A sewage disposal plant was constructed over the settling basin in 1933, and the adjacent dump was closed (Smith 1981:190-191).

**5BL8819** is the **Wellman Ditch**, (Wellman Feeder Ditch, Empson Ditch). The Wellman Ditch diverts water from Boulder Creek at 28th Street and delivers it to South Boulder Creek. The water then flows north in South Boulder Creek and is diverted at Arapahoe Avenue into a canal that feeds the Leggett Reservoir, part of the Valmont Power Plant complex. The Wellman Ditch has a date of Fee Appropriation of May 1, 1878, for 1200 acre-ft. It has priority number 39 from Boulder Creek.

**Significance**: The City Dump (**5BL8820**) is eligible for nomination to the NRHP as an archaeological site, as it is likely to yield information important to history. Unaltered portions of the Wellman Feeder Ditch are eligible for nomination to the NRHP for their association with the development of Water Storage and Irrigation.

**Stream Reach**: Boulder Creek 6
**Site Numbers**: 5BL3742- residence at 1213 17th Street; 5BL3762- Sutherland Residence at 1601 Hillside; 5BL3763-Shattuck Residence at 1605 Hillside; 5BL4675-Boulder High School; 5BL5929-Watts Residence at 120_ 17th Street; 5BL5930-residence at 1230 17th Street; 5BL6167-Parce/Ronshoot/Pollard Residence; 5 BL6169-Pollard/Tisone Residence at 1709 Hillside.

**Background**: **5BL3742** is a **residence** at 1213 17th Street. It is a one-story house of cut stone masonry, in the modern style, built in 1938. **5BL3762** is the **Sutherland Residence** at 1601 Hillside. It is a two-story house with shingled walls atop a stone foundation, a vernacular bungalow built in 1910. In 1926, Blanche Sutherland, an instructor at CU, bought the house and lived there until the 1940s. **5BL3763** is the **Shattuck Residence** at 1605 Hillside. It is a two-story house in the Tudor Revival style, built in 1905 by Herbert Shattuck, developer of the Hillside Park subdivision.

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**5BL4675** is **Boulder High School**. The Art Moderne style building is asymmetrical, composed of narrow layers of native sandstone. The main entrance bay is three stories and includes fixed pane windows grouped in four, and glazed doors with transoms; the eastern wing projects slightly forward and has two-story section with a curved wall topped by windows in a concrete band; behind this is a four-story tower with a clock and glass block. The western wing has bands of multi-light windows with metal sash on the second and third stories; three-light windows on the first story, and a one-story northern projection. The rear of building has a three-story projection with an intersecting wing. Construction began in 1935, and the school was dedicated in November, 1937. Architects were Frank W. Frewen, Earl C. Morris, and Glen H. Huntington. The PWA (Public Works Administration) provided 45% of the cost, which was in excess of $500,000. The YMCA provided a gift of $10,000. The building replaced the State Preparatory School. A field house was built in 1948, and in 1956 an addition extended the shop and cafeteria, added a third floor to the east wing and a girl's gymnasium.

**5BL5929** is the **Watts Residence** at 1220 17th Street. It is a 1½ story house in the English/Norman Cottage style, built in 1925. Kate and Fred Watts resided there. The Watts came to Boulder in 1920 and founded the Watts Dairy, which became the Watts-Hardy Dairy, purchased by Sinton foods in 1983. The Watts died in 1985. **5BL5930** is a **residence** at 1230 17th Street. It is a 1½ story vernacular house with bungalow style details, such as shingled walls, overhanging eaves, exposed rafters, and multi-light windows. It was built in 1906. **5BL6167** is the **Parce/Ronshoot/Pollard Residence** at 1707 Hillside. It is a 1½ story house with rock rubble walls in the Craftsman style, built in 1905. W.W. Parce was a landscape architect who designed the ground of Chautauqua, CU, and the courthouse square. He was an associate of Frederick Law Olmsted. **5BL6169** is the **Pollard/Tisone Residence** at 1709 Hillside. It is a two-story house in the English/Norman Cottage style, built in 1938. Edith N. Pollard lived there. She was a member of the Board of Directors of the Boulder Public Library, and President of the Boulder Historical Society. A.F. Tisone lived there subsequent to Pollard. He was president of Watts-Hardy Dairy for 32 years.

**Significance:** Boulder High School, the Watts Residence, the Parce/Ronshoot/Pollard Residence and the Pollard/Trine Residence have been evaluated as eligible for nomination to the NRHP. The remaining sites have not been evaluated in terms of significance. The three residences may also be eligible for nomination to the NRHP as components of a potential Hillside Road Historic District.

**Stream Reach:** Boulder Creek - 7
**Site Numbers**: 5BL358 - Switzerland Trail; 5BL364 - Highland School; 5BL606 - Train at Central Park; 5BL1129 - Yocum Building, 1724 Broadway; 5BL5680-Bandshell at Central Park; 5BL5820 – Head gate, Boulder & Left Hand Ditch; 5BL5990, 5991, 5992, 5993, 5994 - Athletic field facilities at Boulder High, including the ticket booth, restroom, concession stand and grandstand/press box, respectively; 5BL6017 - Eben G. Fine Park, which surrounds 5BL6015 and 5BL6016, the shelter and restroom at Eben G. Fine Park, respectively; 5BL6062- the bridge at Broadway; 5BL6063 - Central Park; 5BL7094 - Boyd Smelter; 5BL8821 - CCC Stonework; 5BL8822- Sand Pits.

**Background**: **5BL358** is the **Switzerland Trail**, the railroad which was known variously as the Greeley, Salt Lake & Pacific RR, the Colorado & Northwestern RR, and the Denver, Boulder & Western RR.

The railroad bed still exists, and parallels Boulder Creek from the mouth of the canyon, west. That portion of the road bed is currently used as the Boulder Creek Pioneer Trail. Several ashlar bridge

abutments from the railroad still exist in the creek. East of Eben G. Fine Park, a few ashlar stones forming the foundation to a bridge abutment are on the south side of the creek.

The first railways reached the city of Boulder in 1873. The first railway from Boulder into the mountains was constructed by the Union Pacific and was called the Greeley, Salt Lake & Pacific Railroad. It ran through Fourmile Canyon to reach the town site of Sunset in 1883. This first mountain advance was literally washed out in 1894 by flooding. In 1895, Boulder Inter-mountain Railway was incorporated to build a new line, but nothing came of this until a one-time engineer, L.M. Leach, took over and had a new Fourmile Canyon route surveyed (Crossen 1992).

Leach's success came in selling the idea to investors in New York and Pennsylvania. With new investors, the Colorado & Northwestern Railway Company was formed and by 1898, a new, narrow-gauge railway was constructed to Ward, via Fourmile Canyon and Sunset.

The railway was built on the premise that the mines could provide enough ore for shipment to make the line profitable. The railroad company also intended to take advantage of tourist and passenger trade opportunities provided by their scenic mountain route: hence the evocative moniker of "Switzerland Trail."
However, the quantity of ore shipped did not live up to hopes, nor was the tourist trade brisk enough to offset the costs of maintaining a mountain road through snowy winters. In 1909, the railroad was sold and became the Denver, Boulder, & Western Railroad. The only years the railroad showed a profit were 1909 and 1910, hauling freight for the construction of Barker Reservoir at Nederland, and in 1916 with the tungsten boom (Holder 1981).

The Denver, Boulder & Western Railroad ceased operation and the ties and rails were removed in 1919 and 1920.

**5BL364** is the **Highland School**, at 885 Arapahoe Ave. The 2½ story brick and sandstone school was built in 1891-92. It was designed by Denver architects E.P. Varian and Frederick Sterner in the Richardsonian Romanesque Revival style. It is built of red brick with sandstone string coursing, lintels, sills and arches above the second floor windows; a projecting entrance with an ogee arch; gabled dormers with arched windows and turrets. The bridge off 9th Street over Gregory Creek (Mariposa Creek) to the southeast parking lot is in the study area. The bridge is brick and sandstone ashlar, with a well-done wet-laid coursed cobble foundation. The foundation has a concrete culvert to allow Gregory Creek to flow to its confluence with Boulder Creek. An iron grill gate is present.

This was Boulder's fourth permanent school. From 1893-95 it was the location of the University's Preparatory Dept. It was last used as an elementary school in 1970, and now is an office building.

**5BL606** is the **Colorado & Northwestern RR Train** in Central Park. The train is comprised of four units - Locomotive #30, the tender (C&NW RR #30), a passenger car (D&RGW#280), and a caboose (D&RGW #04990). Locomotive #30 operated on the Switzerland Trail between Boulder, Eldora, and Ward from 1898 to 1919; and on the Denver, South Park & Pacific RR and the Rio Grande Southern RR until 1952. In 1953, the train was placed in Central Park, formerly known as Railroad Park, until 1933.

**5BL1129** is **Yocom Studio** at 1724 Broadway. This building in 19th Century Commercial style, was built in 1907 as a photo studio by Lloyd E. Nelson, photographer. In 1932, Daniel Lee Yocom opened his

photo studio in the building. Yocom lived and worked in the building for 40 years, retiring in 1972. The building is currently used as a restaurant (La Estrellita).

**5BL5680** is the **Bandshel**l in Central Park. The Bandshell was designed by architect Glenn Huntington and erected by the Lions Club in 1938 at a cost of $3,825. The Bandshell is an elliptical amphitheater of wood. It has been extensively restored recently. The Bandshell is a city of Boulder Landmark.

**5BL5820** is the **Boulder and Left Hand Ditch**. It shares a head gate on Boulder Creek in Central Park with the adjacent North Boulder Farmers Ditch (**5BL6879**) and Boulder & White Rock Ditch (**5BL859**). The Boulder and Left Hand Ditch has a decree date of December 1, 1873 for 82.8 cfs, with a priority number of 36 for water from Boulder Creek. It was enlarged April 1, 1876, with an appropriation of another 81 cfs and an adjudication date of May 2, 1882. It has a physical capacity of 35 cfs. It is a bermed, U-shaped ditch, four meters wide and two to three meters deep. In places it has been altered to flow though a modern concrete channel.

**5BL5990** is the **Boulder High Field Ticket Booth**. The booth is a one-story building with walls of narrow layers of sandstone of varying thickness, a hipped roof, a concrete foundation and water table, and a concrete apron in front of the ticket windows. The windows, with wooden sills, are boarded up. The booth was built in 1948 with a contribution of $1100 from W. H. McKenna, a retired tungsten miner who contributed to several schools and universities. The stonework is in the style of CU buildings.

**5BL5991** is the **Boulder High Field Restroom**. The restroom is a one-story building with walls of narrow layers of sandstone of varying thickness, a hipped roof with slightly overhanging eaves, a concrete foundation, slab doors, and covered windows with concrete sills. The restroom was built in 1948 as part of the expansion of the high school athletic field and facilities. The stonework is in the style of CU buildings.

**5BL5992** is the **Boulder High Field Concession Stand**. The concession stand is a one-story building with walls of narrow layers of sandstone of varying thickness, a hipped roof with overhanging eaves and exposed rafters, a concrete foundation, slab door, and plate glass window. The concession stand was built in 1948 as part of the expansion of the high school athletic field and facilities. The stonework is in the style of CU buildings.

**5BL5993** is the **Boulder High Field Grandstand/Press Box**. The grandstands are composed of concrete tiered bases currently topped by metal seats (originally cement and wooden seats). Capacity is 5000 spectators. The press box is behind and elevated above the grandstand, and is composed of walls of layered sandstone with a hipped roof. The building has a shed-roofed frame porch with exposed rafters. The west end has a tower with a second story open towards the field (north). The center section of the grandstand was built in 1948, donated by the Boulder Elk's club, and was originally flanked by temporary stands. A combination press box and ticket booth was erected at the back of the stands.

**5BL5994** is the **Boulder High Fieldhouse**. The fieldhouse is a side-gabled 1½ story building. The lower story has shed-roofed additions on the east and west of layered sandstone of varying thickness. The end walls of the lower story are brick, the foundation is concrete. The upper story is frame construction with asbestos siding. A brick chimney is at the rear. The fieldhouse was part of the expansion and improvement of athletic facilities at Boulder High which took place in 1948. An older building was remodeled and expanded.

**APPENDIX II**
**SUMMARY OF CULTURAL RESOURCES**

**5BL6015** is the **Shelter House at Eben G. Fine Park**. The shelter house is a one-story picnic shelter built of rock rubble walls, with a Craftsman style hipped roof with overhanging eaves and exposed rafters. The building has a concrete floor, center entrance, and rectangular window openings between stone piers supporting the roof. The shelter was built in 1921, and provided cooking facilities at the auto camp which is now Eben G. Fine Park (see 5BL6017).

**5BL6016** is the **Restroom at Eben G. Fine Park**. The restroom is one-story, with rock rubble walls and a hipped roof with overhanging eaves and exposed rafters; small vented gables and metal roofing. It has off-center slab doors and a paneled center door, double-hung, 2/2 light windows with concrete sills and lintels. The restroom was built in 1921 for the auto camp which is now Eben G. Fine Park (see 5BL6017).

**5BL6017** is **Eben G. Fine Park**. The park is 3.5 acres, located along the south bank of Boulder Creek, between the creek and Arapahoe Ave., from 3rd St. west to the city limits. The park was originally a free public auto camp, opening in June, 1921. It was developed and given to the city by the Auto Trades Association, the Commercial Association, the Lions Club, and the Rotary Club. The auto camp, with its stone shelter (5BL615) with cooking facilities and restroom (5BL616), was built to attract tourists to Boulder. In 1923, 6,662 visitors from 42 states used the camp. As motels were developed the camp was converted to provide facilities for travel trailers. In 1960, the site was dedicated as a public park, named after Eben G. Fine, a pharmacist and booster of the city who was active in the Boulder Parks system.

**5BL6062** is the **Broadway Bridge**, spanning Boulder Creek at Broadway. The bridge, a two-span steel girder reinforced concrete deck arch highway bridge, was built around 1921. Concrete abutments are at the north and south ends with a concrete pier in the middle. Both sides have concrete railing, divided into 5 segments per span by short concrete piers, it is 102 feet long in two 49 foot spans, and 78 ft wide.

**5BL6063** is **Central Park**. The park, approximately four acres, was originally owned by railroads and known as Railroad Park. The city began buying it in 1906, with further parcels purchased in 1915. The final tracts were acquired in 1933, after which it was called Central Park. In 1938, the Lions Club donated and erected the Bandshell (**5BL5680**), designed by architect Glenn Huntington. In 1953, the train (**5BL606**) from the Switzerland Trail (Colorado & Northwestern RR) was placed in Central Park.

**5BL7094** is the remnants of the **Boyd Smelter**. Foundation walls and scattered artifacts are present. A head gate and diversion wall built to provide water to the smelter are also present. Stone abutments which supported an aerial crossing of the creek by a water line are present on both sides of the creek.

The smelter was built by J.H. Boyd in 1874 to process ores from the hardrock mines west of Boulder. The smelter was a success, though Boyd sold it in 1882 due to poor health. In 1885, Messers, Lord & Co. purchased the smelter and built a reverberating furnace 40 feet long, six feet wide and eight feet high.

**5BL8821** is **Civilian Conservation Corps (CCC) Stonework** along Boulder Creek, most or all done by the CCC in the 1930s. There are three areas which contain stonework:

1) Below Folsom Field: South of the creek is a terraced hillside below the stadium. The eight terraces are created by rubble walls, mostly dry-laid, but with some cement mortar in places. The walls are up to five feet high. The lowest wall, at the floodplain, curves around the base of the hill for 330 ft. Higher

walls are progressively shorter. According to Bill Deno, University Architect, the stadium at that time was a simple bowl, and there was an oval track for the 100 yard dash, with one end of the oval extending out to the hill so that the terraces were needed to support the track at the top of the hill. The stone abutments and piers for the pedestrian bridge here are CCC work, and the concrete auto bridge is also reportedly CCC work.

2) By 19th St., where the steam pipe makes an aerial crossing of the creek from the campus to Family Housing, the abutments for the pedestrian bridge are CCC stonework, as are the stone walls along the creek banks and terraces going up the hill to the campus. The walls along the creek are dry-laid rubble, capped with cement. The walls extend east from the pedestrian bridge with the wall on the north side running along the creek bank and then curving away from the current bank. It is about 365 feet long, and two-four feet high. The wall along the south side of the creek runs along the creek bank and is about 300 feet long and up to five feet high. There are also dry-laid walls forming four terraces going up the hill to the campus, apparently providing stabilization for the path that goes up the hill.

Also present in this area is the ruin of a warming hut or shelter which may not be CCC work. Rubble walls in concrete mortar are present just east of the path to the campus, built up against the hillside. The wall built against the hill is 75 ft long, and 9-12 ft high. It contains a fireplace and chimney in the center of the wall. Side walls extend north from the back wall for 15 feet. The warming hut may not have been totally enclosed, but a shelter with a shed roof and partial side walls. The hut served the CU ice rink, which was adjacent in the 1930s and possibly in the 1920s. After World War II, the ice rink was replaced with tennis courts. The tennis courts were demolished in the 1970s and the area restored into wetlands (Bill Deno, personal communication).

3) By Boulder High School: From the pedestrian bridge which is just east of the Arapahoe Avenue bridge, a stone wall extends east along the south bank of the creek for about 825 feet with a few gaps. The wall is dry-laid rubble about three feet high with a concrete cap in places and sandstone slab cap in places. There are some concrete slabs used as stones in the wall, and in some places tabular sandstone is used as opposed to cobbles.

**5BL8822** are the **Sand Pits** along Boulder Creek. Sand pits had been excavated along Boulder Creek from the area of the current Eben G. Fine Park, east to 9th St. The pits were on both sides of the creek and the creek was diverted to flow through the sand pits in the spring when it had a heavy sediment load. The sediment would be deposited in the pits, and the sand was later quarried and used. The date of the sand pits is unknown but they were still in use in the 1920s and 1930s. The current Kids Fishing Ponds are former sand pits and the diversion head gate next to the western pond was built to divert water into the pits.

Other vestiges of rubble/cobble walls are present on both sides of the creek near 9th St., which are from the pits. A sand pit was present under the 9th St. bridge and a dam was formerly present there. A 25-foot long concrete and rubble wall is still standing on the south side of the creek, west of 9th St., which formerly supported a head gate for diverting water into a pit along the south bank.

**Significance:** The Highland School (5BL364), the Bandshell at Central Park (5BL5680), and the Boyd Smelter (5BL7094) are City Landmarks. The Switzerland Trail (5BL358) is listed on the NRHP. The Colorado and Northwestern Train at Central Park (5BL606) is eligible for nomination to the NRHP for its association with the historic theme of Transportation. Unaltered portions of the Boulder & Left Hand

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Ditch (5BL5820) are eligible for nomination to the NRHP for their association with the development of Water Storage and Irrigation. Boulder High School (5BL4675) is eligible to the NRHP as a type of construction and for its association with significant persons and events (Education). The Civilian Conservation Corps stonework (5BL8821) is eligible as a type of construction and for its association with Education and with the CCC and the Great Depression. Sites which are not individually eligible to the NRHP may be eligible as elements of districts. They are also eligible to the SRHP or for City Land marking. This would include Eben G. Fine Park and the shelter and restroom (5BL6015-6017) and Central Park (5BL6063); the field buildings at Boulder High (5BL5990-59994); the Broadway Bridge (5BL6062), and Yocom Studio (5BL1129).

**Stream Reach**: Skunk Creek - 2
**Site Number**: 5BL8819 - Wellman Ditch
**Background**: See Boulder Creek Reach 5.
**Significance**: See Boulder Creek Reach 5.

**Stream Reach**: Skunk Creek - 5
**Site Numbers**: 5BL3935 - Anderson Ditch; 5BL5954 - Green Mountain Cemetery; 5BL8823 - Concrete dam, diversion and pipe.

**Background:** Site **5BL3935** is the **Anderson Ditch**. The head gate for the ditch is on the south side of the creek, at the mouth of Boulder Canyon. The ditch extends south and southeast through Columbia Cemetery and the University Hill area and flows through Green Mountain Cemetery to Table Mesa Drive. It then continues east along Table Mesa Drive to South Boulder Road which it follows to South Boulder Creek and Baseline Reservoir. The ditch is still active.

The Anderson Ditch was built by the Anderson Ditch Company and dates to October 1, 1860 with an appropriation of 80 acres from Boulder Creek (Dyni 1989; Smith 1986). This ditch was the fourth ditch built off of Boulder Creek (Dyni 1989). The Anderson Ditch Co. was incorporated in 1871 by Jonas Anderson, Marinus G. Smith, and George A. Andrews. In 1874, Anderson donated ten shares in the ditch to the planned University of Colorado. That water has irrigated the University since. The ditch was extended in 1875. In 1891, the company was reorganized as the "New Anderson Ditch Co."

**5BL5954** is the **Green Mountain Cemetery**. The cemetery was established in 1904 by the Boulder Cemetery Association to replace the older Pioneer (Columbia) Cemetery. The leader of the Boulder Cemetery Association was David E. Dobbins, a real estate developer. Approximately 36 acres were acquired from the "rear portion of the 170 acre Old Poor Farm." When the Green Mt. Cemetery opened, 91 bodies were moved from Columbia Cemetery and re-interred. The Green Mt. Cemetery followed the trends of the time, with a rural, park-like setting with curving roads providing access to graves.

**5BL8823** is an **abandoned irrigation feature** at NIST. The feature is along Skunk Creek, just south of the Green Mt. Cemetery. A diversion is present, consisting of a concrete dam spanning the creek, 21.5 ft long, 10 inches wide, with a 3'6" gate in the middle to allow the creek through. A small 16" wide gate on the south side of the creek allows water into an 8" pipe. The pipe extends east along the south bank of the creek for about 50 ft. The pipe is on the surface, set in concrete blocks periodically along its length. It apparently allowed water to irrigate the fields south of the cemetery, east of the creek.

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**SUMMARY OF CULTURAL RESOURCES**

**Significance:** Unaltered segments of the Anderson Ditch (5BL3935) are eligible for nomination to the NRHP for their association with the development of Water Storage and Irrigation. The Green Mountain Cemetery (5BL5954) is eligible for nomination to the NRHP for its association with Community Development and as a type of construction. The abandoned irrigation feature recorded as 5BL8823 is probably not eligible for nomination to the NRHP or SRHP or as a City Landmark.

**Stream Reach:** Bear Creek - 1/2
**Site Number:** 5BL8819 - Wellman Ditch
**Background:** See Boulder Creek Reach 5.
**Significance:** See Boulder Creek Reach 5.

**Stream Reach:** South Boulder Creek - 2
**Site Numbers:** 5BL400-Colorado and Southern Railroad; 5BL799- Valmont Steam Generating Plant, Leggett Inlet, Leggett Outlet; 5BL469-Union Pacific Railroad Spur.

**Background: Colorado & Southern Railroad** - see Goose Creek Reach 4.
**5BL469** is the **Union Pacific Railroad**. In 1870, a group including John Evans, Walter Cheeseman, William Turner, and William Byers organized the Denver & Boulder Valley Railroad Company with capital of $825,000. Track was laid from Brighton to the Erie coal fields. By 1873, the rails had reached the east side of Boulder. In 1873, the D&BV RR was leased to the Denver Pacific RR which was owned by many of the same people. The DP RR went into receivership in April, 1878, was purchased by Jay Gould, and then sold to the Union Pacific. The Union Pacific extended the tracks to the west side of Boulder in 1881 to access mountain railways being constructed to serve the mining communities.
**5BL799** is the **Valmont Steam Electric Generating Plant** which includes Leggett Reservoir, the Leggett Inlet & Outlet. The Valmont power plant was built in 1923. Prior to 1900 there were two lakes at the site - Pancost's Lake and Cove's Lake. Pancost Lake or reservoir was built about 1863. About 1911, the "Pancost Reservoir Enlargement" became Leggett Reservoir because the enlargement decree was held by the Leggett Ditch Company. Hillcrest Reservoir, an adjacent lake, was developed about 1917. Both the Hillcrest and Leggett reservoirs were inundated by the Valmont Reservoir, essentially forming one lake. By 1920, Public Service Co. owned 7/9 of Hillcrest Reservoir, and had an agreement with the Leggett ditch Co. to store water in the lake. Water is delivered from Boulder Creek to South Boulder Creek via the Wellman ditch (5BL8819) and then taken from South Boulder Creek via the Leggett Inlet Ditch (Hillcrest Feeder Ditch) to the lake. Water is returned to South Boulder Creek via the Leggett Outlet Ditch, where it flows into Boulder Creek and is diverted into the Leggett Ditch (5BL860) for irrigation purposes. The reservoir system was enlarged to its current configuration in 1962.

**Significance:** The Colorado & Southern Railroad and the Union Pacific Railroad are eligible for nomination to the NRHP for their association with transportation. The Valmont Power Plant and associated features are eligible for nomination to the NRHP for their association with energy development.

**Stream Reach**: South Boulder Creek 3
**Site Number:** 5BL8819 - Wellman Ditch
**Background:** See Boulder Creek Reach 5.
**Significance:** See Boulder Creek Reach 5.

Cultural resources have not been inventoried for Bluebell Canyon Creek, Dry Creek No. 2, Gregory Canyon Creek, Kings Gulch, Sunshine Creek, Two Mile Canyon Creek and Viele Channel.

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**SUMMARY OF CULTURAL RESOURCES**

| STREAM REACH | SITE NO./NAME | SIGNIFICANCE | | | COMMENTS |
|---|---|---|---|---|---|
| | | NRHP | SRHP | LANDMARK | |
| Fourmile Canyon Creek 3 | 5BL6632-Farmers Ditch | Eligible | Eligible | | Unaltered portions |
| Fourmile Canyon Creek 5 | 5BL3813-Silver Lake Ditch | Eligible | Eligible | | Unaltered portions |
| Wonderland Creek 4/5 | 5BL6632-Farmers Ditch | Eligible | Eligible | | Unaltered portions |
| Wonderland Creek 8 | 5BL3814-Wonderland Lake | Eligible | Eligible | Eligible | May be eligible as a component of an historic district but not individually eligible. |
| | 5BL3815-Degge Fish Rearing Complex | | | | |
| Goose Creek 3 | 5BL5820-Boulder & Left Hand Ditch | Eligible | Eligible | | Unaltered portions |
| | 5BL6879-North Boulder Farmers Ditch | Eligible | Eligible | | Unaltered portions |
| Goose Creek 4 | 5BL400-Colorado & Southern Railroad | Eligible | Eligible | | |
| Goose Creek 5 | 5BL859-Boulder & White Rock Ditch | Eligible | Eligible | | Unaltered portions |
| Boulder Creek 2 | 5BL400-Colorado & Southern Railroad | Eligible | Eligible | | |
| Boulder Creek 5 | 5BL8820-City Dump | Eligible | Eligible | | Site should be protected from looting and disturbance should be monitored by an archaeologist. |
| | 5BL8819-Wellman Ditch | Eligible | Eligible | | Unaltered portions |
| Boulder Creek 6 | 5BL3742- 1213 17th Street | ? | ? | ? | Possibly eligible as component of a historic neighborhood district |

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**SUMMARY OF CULTURAL RESOURCES**

| STREAM REACH | SITE NO./NAME | SIGNIFICANCE | | | COMMENTS |
|---|---|---|---|---|---|
| | | NRHP | SRHP | LANDMARK | |
| | 5BL3762-Sutherland Residence 1601 Hillside | ? | ? | | Possibly eligible as component of a historic neighborhood district |
| | 5BL3763-Shattuck Residence 1605 Hillside | ? | ? | | Possibly eligible as component of a historic neighborhood district |
| | 5BL4675- Boulder High | Eligible | Eligible | | |
| | 5BL5929-Watts Residence 1220 17th Street | Eligible | Eligible | | Eligible individually or as component of a historic neighborhood district |
| | 5BL5930- 1230 17th Street | ? | ? | ? | Possibly eligible as component of a historic neighborhood district |
| | 5BL6167- Parce/Ronshoot/ Pollard Residence- 1707 Hillside | Eligible | Eligible | | Eligible individually or as component of a historic neighborhood district |
| | 5BL6169- Pollard/Tisone Residence - 1709 Hillside | Eligible | Eligible | | Eligible individually or as component of a historic neighborhood district |
| Boulder Creek 7 | 5BL358 - Switzerland Trail | Listed | Listed | | |
| | 5BL364 - Highland School | | | Listed | |
| | 5BL606- Train at Central Park | Eligible | Eligible | | |
| | 5BL1729-Yocum Building | Eligible | Eligible | | Possibly eligible as component of a historic neighborhood district |
| | 5BL5680-Bandshell at Central Park | | | Listed | |
| | 5BL5820- Boulder & Left Hand Ditch | Eligible | Eligible | | Unaltered portions |

**APPENDIX II**
**SUMMARY OF CULTURAL RESOURCES**

| STREAM REACH | SITE NO./NAME | SIGNIFICANCE | | | COMMENTS |
|---|---|---|---|---|---|
| | | NRHP | SRHP | LANDMARK | |
| | 5BL5990, 5991, 5992, 5993, 5994-Field buildings at Boulder High | Eligible | Eligible | | Possibly eligible as component of a historic district |
| | 5BL6015, 6016, 6017 – Eben G. Fine Park and Buildings | Eligible | Eligible | | Possibly eligible as component of a historic district |
| | 5BL6062 - Boulder Creek Bridge at Broadway | Eligible | Eligible | | Possibly eligible as component of a historic district |
| | 5BL6063-Central Park | Eligible | Eligible | | Possibly eligible as component of a historic district |
| | 5BL7094-Boyd Smelter | | | Listed | |
| | 5BL8821-CCC Stonework | Eligible | Eligible | | |
| | 5BL8822- Sand Pits | | | | |
| Skunk Creek 2 | 5BL8819-Wellman Ditch | Eligible | Eligible | | Unaltered portions |
| Skunk Creek 5 | 5BL3935-Anderson Ditch | Eligible | Eligible | | Unaltered portions |
| | 5BL5954- Green Mountain Cemetery | Eligible | Eligible | | |
| | 5BL8823- Concrete dam, diversion, pipe | | | | |
| Bear Creek ½ | 5BL8819-Wellman Ditch | Eligible | Eligible | | Unaltered portions |
| South Boulder Creek 2 | 5BL400-Colorado & Southern Railroad | Eligible | Eligible | | |
| | 5BL799 - Valmont Plant and Associated Features | Eligible | Eligible | | |

**APPENDIX II**
**SUMMARY OF CULTURAL RESOURCES**

| STREAM REACH | SITE NO./NAME | SIGNIFICANCE | | | COMMENTS |
|---|---|---|---|---|---|
| | | NRHP | SRHP | LANDMARK | |
| | 5BL469- Union Pacific Railroad | Eligible | Eligible | | |
| South Boulder Creek 3 | 5BL8819- Wellman Ditch | Eligible | Eligible | | Unaltered portions |

Cultural resources have not been inventoried for Bluebell Canyon Creek, Dry Creek No. 2, Gregory Canyon Creek, Kings Gulch, Sunshine Creek, Two Mile Canyon Creek and Viele Channel.

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## APPENDIX III

## REACH INVENTORIES, PROJECTS AND OPPORTUNITIES

**Stream:** **Bear Canyon Creek**
**Reach:** **1** (BRC 32, 30)
**Location:** **Boulder Creek to Foothills Parkway**

**Habitat conditions:**

| | |
|---|---|
| Vegetation structure: | Good |
| Native plant habitat: | Poor |
| Bird habitat: | Very poor to good |
| Aquatic habitat: | Suboptimal* |

**Other conditions:**

- Trail exists.
- The Open Space property is wooded and relatively wild. Trash, debris, erosion, and recent flooding are evident.

**Opportunities:**

**Flood management:**

- Evaluate possibility of extending berm or constructing a floodwall along Harrison Rd. to prevent spills to neighborhood.
- Mitigate flood hazard and drainage issues according to Comprehensive Flood and Stormwater Utility Master Plan (CFS).
- Maintain flood conveyance capacity through a combination of sediment and selective debris removal and vegetative thinning within the conveyance zone. Non-native species should be selected for removal over native species.
- Acquire properties in the high hazard zone according to the city's pre-flood acquisition program.
- Construct a sediment collection and removal area upstream of Arapahoe.
- Conduct routine maintenance on the Harrison Avenue levee.

**Habitat protection:** P&R-21 + weeds

- Improve vegetation structure and native plant habitat in Open Space properties.
- Weed control and trash removal to improve habitat.
- Protect and enhance wet meadow wetland habitat on property north of Arapahoe Rd.
- Monitor for potential Ute ladies' tresses orchid habitat.
- Protect Plains top minnow habitat in wetland-bottom channel upstream of Arapahoe.

**Water Quality:** WQ-21, 22

- Improve bank stability with vegetation enhancement.
- Provide BMPs at outfalls along Foothills Pkwy.
- Preserve existing water quality functions of wetland south of Arapahoe Rd.

**Cultural resources:**

**5BL8819** - Wellman Ditch - The Wellman Ditch, flowing west to east, intersects Bear Canyon Creek where it flows under the Foothills Parkway, which is the boundary of Reach 1 and Reach 2. On the east side of the Foothills Parkway, north of the current Wellman Ditch, are two abandoned concrete irrigation features where water was apparently diverted from the ditch to irrigate the field to the north.

* Any proposed project in this reach should review the full 2010 aquatic habitat assessment available through the Public Works Water Quality Office

## APPENDIX III

## REACH INVENTORIES, PROJECTS AND OPPORTUNITIES

**Stream:** **Bear Canyon Creek**
**Reach:** **2** (BRC 29, 27, 25, 24)
**Location:** **Foothills Parkway to Baseline Road**

**Habitat conditions:**

| | |
|---|---|
| Vegetation structure: | Good |
| Native plant habitat: | Very poor to good |
| Bird habitat: | Very poor to poor |
| Aquatic habitat: | Suboptimal* |

**Other conditions:**

- Trail exists.
- Creek has some flow. There has been evidence of high water.
- The path is wider than the creek in some places and is constraining the stream corridor.
- Drop structures in places are leaky and undercut.
- Upstream of Wellman, the creek is relatively wild, although the large trapezoidal shape is still predominant.
- Potential Preble's Meadow Jumping mouse habitat.

**Opportunities:**

**Flood management:**

- Mitigate flood hazard and drainage issues according to Comprehensive Flood and Stormwater Utility Master Plan (CFS).
- Maintain flood conveyance capacity through a combination of sediment and selective debris removal and vegetative thinning within the conveyance zone. Non-native species should be selected for removal over native species.
- Acquire properties in the high hazard zone according to the city's pre-flood acquisition program.

**Habitat protection:** P-19 + weeds; R-20 + weeds

- Reduce mowing in buffer area through homeowner education to provide wider riparian area. Install fencing to discourage mowing.
- Replant native plants and control exotics through homeowner education.
- Survey for Preble's Meadow Jumping mouse. Protect mouse habitat by encouraging native plant regeneration.
- Increase plant diversity downstream of Wellman and at Foothills Parkway.

**Water Quality:** WQ-19, 20

- Improve vegetative bank stability in poor reaches.
- Provide water quality BMPs at outfalls.

**Cultural resources:**

**5BL8819** - Wellman Ditch - The Wellman Ditch, flowing west to east, intersects Bear Canyon Creek where it flows under the Foothills Parkway, which is the boundary of Reach 1 and Reach 2. On the east side of the Foothills Parkway, north of the current Wellman Ditch, are two abandoned concrete irrigation features where water was apparently diverted from the ditch to irrigate the field to the north.

* Any proposed project in this reach should review the full 2010 aquatic habitat assessment available through the Public Works Water Quality Office

## APPENDIX III

## REACH INVENTORIES, PROJECTS AND OPPORTUNITIES

**Stream:** **Bear Canyon Creek**
**Reach:** **3** (BRC 22, 20, 18)
**Location:** **Baseline Road to Highway 36**

**Habitat conditions:**

| | |
|---|---|
| Vegetation structure: | Very good |
| Native plant habitat: | Poor to good |
| Bird habitat: | Very poor to good |
| Aquatic habitat: | Suboptimal* |

**Other conditions:**

- Trail exists.
- South side of the creek is relatively unimpacted. It's anticipated that the stream will suffer much more impact with the increased density of use planned for this area by the University.
- 100 year floodplain through CU property proposed to be developed for student housing.
- Mowing is too close to the stream bank on the north side of the creek and near the church. Downstream of church driveway, the creek is very narrowly confined.
- Lots of weeds throughout the reach.

**Opportunities:**

**Transportation/Recreation:**

- Improve connections to Greenways system as part of William's Village Master Plan.

**Flood management:**

- Mitigate flood hazard and drainage issues according to Comprehensive Flood and Stormwater Utility Master Plan (CFS).
- Maintain flood conveyance capacity through a combination of sediment and selective debris removal and vegetative thinning within the conveyance zone. Non-native species should be selected for removal over native species.
- Acquire properties in the high hazard zone according to the city's pre-flood acquisition program.

**Habitat protection/Water quality:** P-18, WQ-15, 16, 17, 18

- Improve vegetation structure and bank stability in association with CU development.
- Work with CU to protect wide buffer area and develop structural access points along the stream banks. (Opportunity for passive flood management in conjunction with William's Village Master Plan)
- Work with the church and CU to reduce mowing along the stream banks and restore riparian areas.
- Provide BMPs at outfalls and near Baseline Rd.

* Any proposed project in this reach should review the full 2010 aquatic habitat assessment available through the Public Works Water Quality Office

**APPENDIX III**

**REACH INVENTORIES, PROJECTS AND OPPORTUNITIES**

| | |
|---|---|
| **Stream:** | **Bear Canyon Creek** |
| **Reach:** | **4** (BRC 15, 14, 12) |
| **Location:** | **Highway 36 to Broadway underpass** |

**Habitat conditions:**

| | |
|---|---|
| Vegetation structure: | Good |
| Native plant habitat: | Poor to good |
| Bird habitat: | Very poor to poor |
| Aquatic habitat: | Suboptimal* |

**Other conditions:**

- Trail exists.
- Beginning of reach (upstream) is constructed with large stacked boulders (plunge pool) with no vertical diversity in the channel structure.
- Portions of the reach were not adequately revegetated after the recent channel project. Lots of washed out rock walls and constructed drops. Drop structures are deteriorating in the upstream reaches.
- Downstream portion of the reach, the creek is in a flume built from vertical grouted rock walls. There is not much room for the creek and the path through the residential neighborhood. The creek has been severely channelized and confined between vertical rock walls with little vegetation.
- Relatively little cover in portions of the reach. Vegetation is predominately exotic with almost no native cover. Extent of the riparian area is limited by concrete and mowing.

**Opportunities:**

**Flood management:**

- Mitigate flood hazard and drainage issues according to Comprehensive Flood and Stormwater Utility Master Plan (CFS).
- Evaluate need for drop structure replacement before they are repaired.
- Maintain flood conveyance capacity through a combination of sediment and selective debris removal and vegetative thinning within the conveyance zone. Non-native species should be selected for removal over native species.
- Acquire properties in the high hazard zone according to the city's pre-flood acquisition program.

**Habitat protection:** R-17 + weeds

- Improve habitat quality through vegetation enhancement.
- Increase instream habitat diversity by leaving stable blown-out drop structures.
- Manage weeds.
- Reduce mowing through park and school grounds to provide wider riparian area.
- Explore fencing to discourage trampling and excessive mowing.
- Provide homeowner education to improve creek care.
- Remove concrete from around tree trunks to prevent loss of trees.

**Water quality:**

- Revegetate unstable banks.
- Protect and maintain pool/riffle sequence in channel.
- Provide BMP near Moorhead.

* Any proposed project in this reach should review the full 2010 aquatic habitat assessment available through the Public Works Water Quality Office

**APPENDIX III**

**REACH INVENTORIES, PROJECTS AND OPPORTUNITIES**

**Stream:** **Bear Canyon Creek**
**Reach:** **5** (BRC 11, 9, 7, 6)
**Location:** **Broadway underpass to Lehigh Street**

**Habitat conditions:**

| | |
|---|---|
| Vegetation structure: | Poor |
| Native plant habitat: | Poor |
| Bird habitat: | Poor to good |
| Aquatic habitat: | Suboptimal* |

**Other conditions:**

- No trail exists.
- Creek passes between lanes of Table Mesa Dr.
- Many grouted rock drop structures have been constructed, but the grouted part is buried and vegetated.
- At the bridges, the creek gets very wide and deposits sand.
- Lots of trash.
- Weedy plants dominate the roadside portion of the floodplain. Exotics and garden escapees are also present.

**Opportunities:**

**Transportation/Recreation**:

- Construct a bike trail along Table Mesa Dr. if flood mitigation opportunities present funding (the 2004 TMP does not include this segment as it is a low priority segment for the Transporation Division but agree if funding becomes available).
- Provide an underpass just west of Broadway to cross Table Mesa Dr.

**Flood management:**

- Mitigate flood hazard and drainage issues according to Comprehensive Flood and Stormwater Utility Master Plan (CFS).
- Maintain flood conveyance capacity through a combination of sediment and selective debris removal and vegetative thinning within the conveyance zone. Non-native species should be selected for removal over native species.
- Acquire properties in the high hazard zone according to the city's preflood acquisition program.

**Habitat protection:**

- Enhance wetland with native plantings. Plant native tree and shrub plantings to improve cover value.
- Soften drops by burying rock structures and revegetating.
- Reduce mowing along the stream banks.

**Water quality:** WQ-9, 10, 11, 12, 13, 14

- Improve water quality by controlling runoff from Table Mesa Dr. Construct BMPs downstream of road crossing between lanes of Table Mesa Dr and at outfalls.
- Revegetate unstable banks.

* Any proposed project in this reach should review the full 2010 aquatic habitat assessment available through the Public Works Water Quality Office

## APPENDIX III

## REACH INVENTORIES, PROJECTS AND OPPORTUNITIES

**Stream:** **Bear Canyon Creek**
**Reach:** **6** (BRC 03, 01)
**Location:** **Lehigh Street to city limits**

**Habitat conditions:**

| | |
|---|---|
| Vegetation structure: | Good to very good |
| Native plant habitat: | Very good to excellent |
| Bird habitat: | Good |
| Aquatic habitat: | Optimal* |

**Other conditions:**

- Reach is situated in an unconstrained flood plain at the base of the foothills with a relatively wide riparian area.
- Creek is relatively wild. Vegetation is dominated by native species in the canopy and exotics in the herbaceous understory.
- Some trash, concrete rubble, cable TV wire across the stream.
- Lots of mowing within riparian area - especially along the church and school.
- Some erosion, vertical banks, evidence of recent high water.
- Many social trails.

**Opportunities:**

**Flood management:**

- Mitigate flood hazard and drainage issues according to Comprehensive Flood and Stormwater Utility Master Plan (CFS).
- Maintain flood conveyance capacity through a combination of sediment and selective debris removal and vegetative thinning within the conveyance zone. Non-native species should be selected for removal over native species.

**Habitat protection/Water quality:** P-16

- Protect and enhance this section of the creek for habitat quality.
- Remove riprap and concrete rubble and stabilize with vegetation.
- Use homeowner education to reduce extent of mowing in the buffer areas, control weeds (Canada thistle and Bouncing Bet) and to enhance native vegetation.
- Improve base flow and aquatic habitat.

*** Any proposed project in this reach should review the full 2010 aquatic habitat assessment available through the Public Works Water Quality Office**

## APPENDIX III

## REACH INVENTORIES, PROJECTS AND OPPORTUNITIES

| | |
|---|---|
| **Stream:** | **Bluebell Canyon Creek** |
| **Reach:** | **1** (BLC 05, 04, 03) |
| **Location:** | **East of 19th Street (west of Anderson ditch) to east of 15th Street** |

**Habitat conditions:**

| | |
|---|---|
| Vegetation structure: | Very good |
| Native plant habitat: | Good |
| Bird habitat: | |
| Aquatic habitat: | NA |
| Primary (streambed): | Poor |
| Secondary (channel morphology): | Poor |
| Tertiary (bank stabilization): | Fair |
| Vegetative bank stability: | Fair |

**Other conditions:**

- Runs through residential yards
- Channel very narrow
- Drainage and flood hazards identified in Phase B Major Drainage Way Planning Report (1987)

**Opportunities:**

**Flood management:**

- Floodplain is primarily shallow street flooding
- Flood damage is generally light but affects several buildings
- Outreach to adjacent neighborhood to raise awareness of flood hazards
- Floodplain mapping update underway that will guide mitigation efforts

**Habitat protection:**

- Educate residents and outreach to encourage stewardship and improve native plants.

**Water quality:**

- Educate adjacent neighborhoods to encourage backyard management to protect habitat, wetlands and enhance water quality.

**APPENDIX III**

**REACH INVENTORIES, PROJECTS AND OPPORTUNITIES**

| | |
|---|---|
| **Stream:** | **Bluebell Canyon Creek** |
| **Reach:** | **2** (BLC 02, 01) |
| **Location:** | **Just east of 15th Street to 12th Street** |

**Habitat conditions:**

| | |
|---|---|
| Vegetation structure: | Good |
| Native plant habitat: | Poor |
| Bird habitat: | Good |
| Aquatic habitat: | Fair |
| Primary (streambed): | Poor |
| Secondary (channel morphology): | Poor |
| Tertiary (bank stabilization): | Good |
| Vegetative bank stability: | Good |

**Other conditions:**

- Runs through residential yards with little public access.
- Channel very narrow
- Drainage and flood hazards identified in Phase B Major Drainage Way Planning Report (1987)

**Opportunities:**

**Flood management:**

- Creek is narrow and confined.
- Floodplain is narrow (50' wide) within Bluebell Canyon
- Outreach to adjacent neighborhood to raise awareness of flood hazards
- Floodplain mapping underway that will guide mitigation efforts

**Habitat protection:**

- Educate residents and outreach to encourage stewardship and improve native plants.

**Water quality:**

- Educate adjacent neighborhoods to encourage backyard management to protect habitat, wetlands and enhance water quality.

## APPENDIX III

## REACH INVENTORIES, PROJECTS AND OPPORTUNITIES

**Stream:** **Boulder Creek**
**Reach:** **1**
**Location:** **63rd Street to Goose Creek**

**Habitat conditions:**

| | |
|---|---|
| Vegetation structure: | No data |
| Native plant habitat: | |
| Bird habitat: | |
| Aquatic habitat: | Suboptimal* |

**Other conditions:**

- Trail exists from Valmont to Goose Creek.
- Concrete revetments on the right bank are failing and are undercut. There is a concrete drop structure with a concrete block jutting out of the creek.
- The vegetation is dominated by exotics. Linear cover by sandbar willow along the creek could provide good cover for Preble's Meadow Jumping mouse.

**Opportunities:**

**Transportation/Recreation:**

- Provide a trail connection to Gunbarrel.

**Flood management:**

- Mitigate flood hazard and drainage issues according to Comprehensive Flood and Stormwater Utility Master Plan (CFS).
- Maintain flood conveyance capacity through a combination of sediment and selective debris removal and vegetative thinning within the conveyance zone. Non-native species should be selected for removal over native species.
- Acquire properties in the high hazard zone according to the city's pre-flood acquisition program.

**Habitat protection:**

- Protect and enhance high quality habitat in Open Space.
- Manage weeds and replant with native vegetation.
- Control illegal camping in area.

**Water quality:** WQ-39

- Implement BMPs for the outfall from the office use at 55th St. and Boulder Creek.
- Remove failed and undercut concrete bank protection and replace with bioengineering approaches.
- Remove concrete block from drop/pool.

* Any proposed project in this reach should review the full 2010 aquatic habitat assessment available through the Public Works Water Quality Office

**APPENDIX III**

**REACH INVENTORIES, PROJECTS AND OPPORTUNITIES**

**Stream:** **Boulder Creek**
**Reach:** **2** (BC 51, 50, 49, 48, 47)
**Location:** **Goose Creek to Foothills Parkway**

**Habitat conditions:**

| | |
|---|---|
| Vegetation structure: | Good to very good |
| Native plant habitat: | Poor to good |
| Bird habitat: | Poor to good |
| Aquatic habitat: | Optimal* |

**Other conditions:**

- Trail exists.
- Wetlands adjacent to Pearl St. Business Park have Ute ladies` tresses orchid.
- Cottonwood Grove is dominated by exotics, primarily crack and golden osier willows.
- Creek has many riffles.
- Natural channel processes taking place downstream. Erosion, channel bars, point bars, cross-overs. No real drops, but pools are present at fallen trees.

**Opportunities:**

**Transportation/Recreation:**

- Provide trail access from Arapahoe Ave. on 48th St. to the Boulder Creek trail minimizing impacts to Boulder Creek.
- Manage social trail system. Restrict soft trail use by closing and re-vegetating non-designated social trails.

**Flood management:**

- Widen drainage swales from Arapahoe Ave. to allow more drainage collection and enhance wetlands.
- Improve levee behind Roche property.
- Mitigate flood hazard and drainage issues according to Comprehensive Flood and Stormwater Utility Master Plan (CFS).
- Maintain flood conveyance capacity through a combination of sediment and selective debris removal and vegetative thinning within the conveyance zone. Non-native species should be selected for removal over native species.
- Acquire properties in the high hazard zone according to the city's pre-flood acquisition program.

**Habitat protection:** P&R-47, 22 + weeds; P-26 + weeds

- Widen and re-vegetate riparian corridor where feasible.
- Protect and enhance wet meadow and conveyance zone on property east of Foothills Pkwy.
- Protect and enhance Cottonwood Grove.
- Control weeds and replant with natives.
- Remove concrete debris.
- Work with landowner north of the creek to protect and enhance existing *Spiranthes diluvialis* population.

**Water quality:** WQ-34, 35, 36, 37, 38, 49, 57

- Implement BMPs as part of new development at the property at Arapahoe and Foothills Pkwy., in conjunction with the Roche levee improvements, and at the outfall from Pearl St. Business Park.
- Opportunity for stream restoration near RR bridge.
- Protect good quality aquatic habitat in this reach.
- Improve water quality treatment functions of pond between outlet of Goose Creek and the pond connecting to Boulder Creek.

**Cultural resources:**

**5BL400** - Colorado & Southern Railroad - The railroad crosses Boulder Creek, running northwest – southeast.

* Any proposed project in this reach should review the full 2010 aquatic habitat assessment available through the Public Works Water Quality Office

## APPENDIX III

## REACH INVENTORIES, PROJECTS AND OPPORTUNITIES

**Stream:** **Boulder Creek**
**Reach:** **3** (BC 45)
**Location:** **Foothills Parkway to Arapahoe Road**

**Habitat conditions:**

| | |
|---|---|
| Vegetation structure: | Good |
| Native plant habitat: | Very poor |
| Bird habitat: | Poor |
| Aquatic habitat: | Suboptimal* |

**Other conditions:**

- Trail exists.
- Channel banks are relatively steep, but vegetated with root wads and moss. Many access points.
- Stream corridor gets very narrow just upstream of Foothills Parkway. Exotic vegetation dominates canopy, subcanopy, and herbaceous groundcover.

**Opportunities:**

**Flood management:**

- Mitigate flood hazard and drainage issues according to Comprehensive Flood and Stormwater Utility Master Plan (CFS).
- Maintain flood conveyance capacity through a combination of sediment and selective debris removal and vegetative thinning within the conveyance zone. Non-native species should be selected for removal over native species.
- Acquire properties in the high hazard zone according to the city's pre-flood acquisition program.

**Habitat protection:**

- Control weeds.
- Enhance and widen riparian area with native plantings.
- Manage trampling of stream bank by re-vegetating impacted sections and by managing access points. Establish localized boater access to limit bank erosion near Jose Muldoon's.
- Clean up trash.

**Water quality** WQ-33

- Provide a boat ramp at Jose Muldoons to decrease erosion.
- Improve aquatic habitat quality through bank re-vegetation.

* Any proposed project in this reach should review the full 2010 aquatic habitat assessment available through the Public Works Water Quality Office

## APPENDIX III

## REACH INVENTORIES, PROJECTS AND OPPORTUNITIES

**Stream:** **Boulder Creek**
**Reach:** **4** (BC 42, 39, 37)
**Location:** **Arapahoe Road to 30th Street**

**Habitat conditions:**

| | |
|---|---|
| Vegetation structure: | Very good |
| Native plant habitat: | Very poor |
| Bird habitat: | Poor to very good |
| Aquatic habitat: | Suboptimal* |

**Other conditions:**

- Trail exists.
- Lots of bank erosion and trampling from access. Cobble deposit under the 30th St. bridge and downstream. Rock walls, concrete rubble, trash, constructed drops, debris in the creek.
- Sump pump for dewatering the path is discharging rusty water to the creek.
- Vegetation along this reach is dominated by exotics. The overstory is entirely crack willow with almost no shrub canopy.

**Opportunities:**

**Transportation/Recreation:**

- Provide connection to CU family housing on the east side.

**Flood management:**

- Mitigate flood hazard and drainage issues according to Comprehensive Flood and Stormwater Utility Master Plan (CFS).
- Maintain flood conveyance capacity through a combination of sediment and selective debris removal and vegetative thinning within the conveyance zone. Non-native species should be selected for removal over native species.
- Acquire properties in the high hazard zone according to the city's pre-flood acquisition program.

**Habitat protection:** P&R-46 + weeds

- Work with CU to protect and enhance native plant and bird habitat quality at the CU Research Park.
- Control weeds and exotics.
- Close social trails in riparian area and re-vegetate.
- Remove trash and concrete rubble.

**Water quality:** WQ-29,30,31,32

- Protect and enhance complex channel structure.
- Reduce erosion through bio-stabilization.
- Fix trail drainage issue under Arapahoe Ave. (see conditions above)
- Work with CU to implement BMPs at the CU Research Park.
- Work with CU to install BMP at 30th Street storm sewer outfall to treat mall runoff.
- Install BMP at the 30th Street outfall

* Any proposed project in this reach should review the full 2010 aquatic habitat assessment available through the Public Works Water Quality Office

**APPENDIX III**

**REACH INVENTORIES, PROJECTS AND OPPORTUNITIES**

**Stream:** **Boulder Creek**
**Reach:** **5** (BC 43, 32, 30)
**Location:** **30th Street to Folsom Street**

**Habitat conditions:**

| | |
|---|---|
| Vegetation structure: | Good |
| Native plant habitat: | Very poor to poor |
| Bird habitat: | Very poor to poor |
| Aquatic habitat: | Suboptimal* |

**Other conditions:**

- Trail exists.
- The creek is very confined near the hotel tennis courts and the Gold Run condos. The buildings are built into the creek banks. The drop structure in this location is being undercut. The access for cleaning the head gate is eroded.
- Lots of trash, concrete rubble, curb stops, and constructed drops.
- Stream bottom is fully grouted under the 28th St. bridge.
- Lots of erosion and trampling from social access points.
- Sedimentation under the 30th St. bridge.
- The vegetation is primarily exotic and is limited to a narrow band of trees.

**Opportunities:**

**Transportation/Recreation**

- Improve trail connection between Boulder Creek trail, the Village shopping Center, and 29th Street Mall along 28th St.
- The existing trail between 28th Street and Scott Carpenter park is narrow and winding with limited sight distance. Consider widening and straightening the alignment as opportunities arise.

**Flood management:**

- Mitigate flood hazard and drainage issues according to Comprehensive Flood and Stormwater Utility Master Plan (CFS).
- Maintain flood conveyance capacity through a combination of sediment and selective debris removal and vegetative thinning within the conveyance zone. Non-native species should be selected for removal over native species.
- Acquire properties in the high hazard zone according to the city's pre-flood acquisition program.

**Habitat protection:** Weeds

- Use homeowner education to: Control weeds (Canada thistle); limit mowing in buffer areas; introduce native plantings in buffer areas; and limit access point to the creek to preserve bank stability.
- Enhance native vegetation.
- Soften rock structures and drops in the creek to enhance aquatic habitat.
- Limit further impacts to stream banks and riparian area through the hotel site.
- Close and reclaim social trail along the creek bank.

**Water Quality:** WQ-66, 67

- Implement BMPs at the 30th St. and 28th St. outfalls.
- Improve instream cover between 28th St. and 30th St.
- Remove drops which act as barriers to fish movement.
- Provide a swale as a BMP along the west edge of Scott Carpenter Park.
- Revegetation and bank stabilization on north side of channel just upstream of 30th.

**Cultural resources:**

**5BL8820** - City Dump - Scott Carpenter Park is on top of a city dump dating to 1895. The dump is an archaeological site.

**5BL8819** - Wellman Ditch - The Wellman Ditch diverts water from Boulder Creek at 28th St.

* Any proposed project in this reach should review the full 2010 aquatic habitat assessment available through the Public Works Water Quality Office

## APPENDIX III

## REACH INVENTORIES, PROJECTS AND OPPORTUNITIES

**Stream:** **Boulder Creek**
**Reach:** **6** (BC 28, 26, 22)
**Location:** **Folsom Street to 17th**

**Habitat conditions:**

| | |
|---|---|
| Vegetation structure: | Poor to very good |
| Native plant habitat: | Very poor to good |
| Bird habitat: | Very poor to poor |
| Aquatic habitat: | Suboptimal* |

**Other conditions:**

- Trail exists.
- High use of the area has resulted in numerous uncontrolled access points to the creek and social trails. Severe erosion in places from bank trampling and loss of riparian vegetation.
- Lots of trash and dead animals, campsites, patios, mowed lawns.
- Vertical rock retaining walls along much of the south bank. Concrete rubble in some locations.
- Very limited native vegetation.

**Opportunities:**

**Flood management:**

- Mitigate flood hazard and drainage issues according to Comprehensive Flood and Stormwater Utility Master Plan (CFS).
- Maintain flood conveyance capacity through a combination of sediment removal and selective debris removal and vegetative thinning within the conveyance zone. Non-native species should be selected for removal over native species.
- Acquire properties in the high hazard zone according to the city's pre-flood acquisition program.

**Habitat protection:** P-45 + weeds, R-35 + weeds

- Enhance quality of native plant and bird habitat. Re-vegetate impacted areas with native plantings. Replace dead cottonwoods with new plantings.
- Control access to stream and re-vegetate impacted stream banks.
- Manage weeds and exotics.
- Remove campsites and trash.
- Work with CU to protect and enhance riparian area and to consolidate bridges.

**Water Quality:** WQ-26, 28

- Improve vegetative bank stability.
- Protect good quality aquatic habitat between 15th & 21st Streets.
- Install BMPs west of Folsom, north and south of Boulder Creek

**Cultural Resources:**

**5BL8821** - Civilian Conservation Corps Stonework - Stonework done by the CCC in the 1930s is present along Boulder Creek in three places: below Folsom Field, at the end of 19th St., and by Boulder High School.
**5BL3742** - residence, 1213 17th St.
**5BL5929** - Watts Residence, 120 17th St.
**5BL5930** - residence, 1230 17th St.
**5BL3762** - Sutherland Residence, 1601 Hillside
**5BL3763** - Shattuck Residence, 1605 Hillside
**5BL6167** - Parce/Ronshoot/Pollard Residence, 1707 Hillside
**5BL6169** - Pollard/Tisone Residence, 1709 Hillside
**5BL4675** - Boulder High School, built in 1937

* Any proposed project in this reach should review the full 2010 aquatic habitat assessment available through the Public Works Water Quality Office

**APPENDIX III**

**REACH INVENTORIES, PROJECTS AND OPPORTUNITIES**

| | |
|---|---|
| **Stream:** | **Boulder Creek** |
| **Reach:** | **7** (BC 19, 17, 15, 12, 9, 6, 4, 3) |
| **Location:** | **17th Street to mouth of Boulder Canyon** |

**Habitat conditions:**

| | |
|---|---|
| Vegetation structure: | Good to very good |
| Native plant habitat: | Poor to very good |
| Bird habitat: | Very poor to good |
| Aquatic habitat: | Suboptimal* |

**Other conditions:**

- Trail exists.
- This reach of the creek has been devoted to recreational uses with resultant impacts to habitat and possibly water quality. A kayak course is constructed in the western portion of the creek. The south bank in Eben G. Fine Park is entirely artificial with quarried rock and a concrete path at the water's edge. The north bank is relatively natural.
- Numerous access points and social trails along both sides of the entire reach have caused severe impacts to the banks and riparian area. The hanging of racing gates has caused erosion and slope stability problems. Picnic tables are right on the creek banks, people and pet access is unlimited, causing severe trampling, vegetation loss, and erosion.
- Several stormwater outfall pipes drain directly into the creek with no vegetative buffering.
- Regeneration of native plants is minimal. Given current trends, there will be little canopy cover along the creek in the future unless restoration efforts are made.

**Opportunities:**

**Transportation/Recreation:**

- Establish access points/steps for hanging racing gates to protect stream bank from erosion.

**Flood management:**

- Mitigate flood hazard and drainage issues according to Comprehensive Flood and Stormwater Utility Master Plan (CFS).
- Maintain flood conveyance capacity through a combination of sediment and selective debris removal and vegetative thinning within the conveyance zone. Non-native species should be selected for removal over native species.
- Acquire properties in the high hazard zone according to the city's pre-flood acquisition program.
- Restore creek bank and overbank areas in Eben Fine Park

**Habitat protection:** P&R-23 + weeds; P-24 + weeds

- Enhance quality of native plant and bird habitat. Protect north side of creek along kayak course from disturbance and construction.
- Replant native woody vegetation to enhance understory and overstory and widen riparian areas along entire reach.
- Enhance buffer area near kayak course. Soften structural treatments such as the south bank along the kayak course.
- Begin a tree replacement project. Re-vegetate south bank through Eben G. Fine Park.
- Work with homeowners to manage creek through native re-plantings and weed control and limiting access to creek from private residences. Remove private patios and decks from the creek banks.
- Close and replant undesignated access points and social trails.
- Control weeds and exotics.

**Water Quality:** WQ-23, 24, 25, 27, 47, 48, 64, 65

- Implement BMPs at 9th and Canyon, west of 13th and 11th and Canyon.
- Protect good quality aquatic habitat which exists upstream of 9th St.
- Improve water quality of kid's fishing pond through active treatment and update educational signs
- Improve vegetative bank stability and channel conditions to enhance water quality throughout reach, especially at Eben G. Fine Park and kayak course.

- Work with the high school to address maintenance issues and education about creek care.
- Improve aquatic habitat at kayak course. Use upstream section of Boulder Creek as design guide. Provide more water for better quality habitat.

**Cultural resources:**

**5BL5990** - Field Ticket Booth, Boulder High, built in 1948
**5BL5991** - Field Restroom, 1948
**5BL5992** - Field Concession Stand, 1948
**5BL5993** - Field Grandstand/Press Box, 1948
**5BL5994** - Field House, 1948
**NOTE** - There is an aerial crossing of Boulder Creek by a sewer pipe, between the Field House and High School.
**5BL8821** - Civilian Conservation Corps Stonework - Stonework done by the CCC along Boulder Creek near Boulder High School extends into this reach.
**5BL1129** - Yocom Building, 1724 Broadway
**5BL6063** - Central Park
**5BL5680** - Bandshell in Central Park - The Bandshell is outside the study area, but is a major feature of Central Park
**5BL606** - Train in Central Park
**5BL5820** - Head gate for Boulder & Left Hand Ditch
**5BL6062** - Bridge over Boulder Creek at Broadway
**5BL364** - Highland School - The Highland School building is outside the study area, but a bridge leading to the school parking area crosses Gregory Creek on the south side of Boulder Creek, west of 9th Street.
**5BL8822** - Sand Pits - former sand pits along Boulder Creek are now the Kids Fishing Ponds. The diversion and head gate used to channel creek water into the sand pits are still used for the fishing ponds.
**5BL358** - "Switzerland Trail" - Colorado & Northwestern Railroad ashlar masonry bridge abutment foundation is present along the south bank of the creek, across from the Boyd Smelter ruins.
**5BL7094** - Boyd Smelter - The ruins of the Boyd Smelter are west of the Justice Center, on the north side of the creek.
**5BL6017** - Eben G. Fine Park
**5BL6015** - Shelter at Eben G. Fine Park
**5BL6016** - Restroom at Eben G. Fine Park

**NOTE** - Historic residences south of the creek, fronting on Arapahoe Ave., are present from Eben G. Fine Park to 9th Street. The house's back yards are adjacent to the creek, but the buildings are not particularly visible from the creek and have not been listed here.

* Any proposed project in this reach should review the full 2010 aquatic habitat assessment available through the Public Works Water Quality Office

## APPENDIX III

## REACH INVENTORIES, PROJECTS AND OPPORTUNITIES

**Stream:** **Dry Creek #2**
**Reach:** **1** (DC 10, 11, 12, 13, 14, 15)
**Location:** **Southwest end of KOA lake to Arapahoe Avenue**

**Habitat conditions:**

| | |
|---|---|
| Vegetation structure: | Poor |
| Native plant habitat: | Very good to good |
| Bird habitat: | Good to poor |
| Aquatic habitat: | Fair to poor |
| Primary (streambed): | Fair to poor |
| Secondary (channel morphology): | Poor |
| Tertiary (bank stabilization): | Good to fair |
| Vegetative bank stability: | Good to fair |

**Other conditions:**

- Purple loosestrife found in two small patches
- Northern end of reach connects with paved bike trail
- Possible *Spiranthes* habitat
- Wide active floodplain can accommodate high flood flows
- Excellent cover, good available water, some adjacent lots remain undeveloped
- Proximity of willow thickets to open meadows suggest Preble's Meadow Jumping mouse habitat
- Dense cattail marsh provides excellent breeding habitat for deer and cover for other species
-

**Opportunities:**

**Habitat protection:**

- Purple loosestrife needs to be eradicated
- Upland areas could be replanted with native short grass prairie mix
- Remove planted Tamarisk and Russian Olives (Russian Olive control program can be vastly improved – periodic long-term maintenance will be critical)
- Knapweed control critical
- Replant uplands around trail
- Side slopes in need of weed control and potential replanting or interseeding with native species
- Wetland diversity would be enhanced by improving the heterogeneity of the channel bottom (balancing cut and fill to raise areas out of cattail or to drown cattails)
- Maintenance of uplands around the channel

**Transportation:**

- Complete trail connection from Arapahoe Road to KOA.

**Water quality:**

- Good opportunity for improvement by removing obsolete drop structure (or apparently obsolete)
- Improve aquatic habitat through plantings and channel enhancements

**APPENDIX III**

**REACH INVENTORIES, PROJECTS AND OPPORTUNITIES**

**Stream:** **Dry Creek #2**
**Reach:** **2** (DC 03, 04, 05, 07, 08, 09)
**Location:** **Arapahoe Avenue to 55th Street**

**Habitat conditions:**

| | |
|---|---|
| Vegetation structure: | Good to very poor |
| Native plant habitat: | Excellent to very poor |
| Bird habitat: | Good to poor |
| Aquatic habitat: | Good to poor |
| Primary (streambed): | Fair |
| Secondary (channel morphology): | Poor |
| Tertiary (bank stabilization): | Fair to poor |
| Vegetative bank stability: | Fair to poor |

**Other conditions:**

- Channel constrained by busy road and its frontage street
- Creek channelized
- Existing bike lane along 55th Street
- Ponds present
- Runs through Flatirons golf course

**Opportunities:**

**Habitat protection:**

- Improve width by limiting mowing 20-30 feet
- Control weeds and restore native vegetation
- Work with managers to enhance ecological values
- Low priority for work unless a group seeks to undertake stewardship as a volunteer effort
- Russian olive removal
- Mowing of uplands to help control *Breea arvensis* and *Cardaria latifolia*
- Perhaps establish an adopt-a-reach by local business
- Improve width of buffers for Dry Creek by planting native vegetation along shore lines.

**Flood Management:**

- Mitigate flood hazard and drainage issues according to the South Boulder Creek Major Drainageway Plan (anticipated to be completed in 2011).

**Water quality:**

- Enhance aquatic habitat along ponds and Dry Creek in conjunction with buffer improvements
- Achieve Audubon Cooperative Sanctuary Program designation or other comparable rating system at Flatirons Golf Course
- Provide wetland or other passive BMPs at storm water outfall at aerated pond
- Educate adjacent neighborhoods to encourage backyard management to protect habitat, wetland and enhance water quality

## APPENDIX III

## REACH INVENTORIES, PROJECTS AND OPPORTUNITIES

**Stream:** **Dry Creek #2**
**Reach:** **3** (DC 01, 02)
**Location:** **55th Street to Baseline Road**

**Habitat conditions:**

| | |
|---|---|
| Vegetation structure: | Good |
| Native plant habitat: | Good |
| Bird habitat: | Poor |
| Aquatic habitat: | Poor |
| Primary (streambed): | Poor |
| Secondary (channel morphology): | Poor |
| Tertiary (bank stabilization): | Fair |
| Vegetative bank stability: | Fair |

**Other conditions:**

**Opportunities:**

**Habitat protection:**

- Russian olive removal and control
- Homeowner education regarding the fate of exotics
- Work with Flatirons Golf Course managers to enhance ecological values

**Flood Management:**

- Mitigate flood hazard and drainage issues according to the South Boulder Creek Major Drainageway Plan (anticipated to be completed in 2011).

**Recreation:**

- Make Flatirons Golf Course improvements including expanding the driving range, adding a new Pro Shop and new banquet / restaurant / conference facility, trail system and enhanced parking
- Achieve Audubon Cooperative Sanctuary Program designation at Flatirons Golf Course

**Transportation:**

- Complete trail connection from Centennial trail to Arapahoe Road

## APPENDIX III

## REACH INVENTORIES, PROJECTS AND OPPORTUNITIES

**Stream:** **Elmer's Two Mile Creek**
**Reach:** **1** (ETC 05, 04, 03, 02, 01)
**Location:** **Goose Creek to Parkside Park**

**Habitat conditions:**

| | |
|---|---|
| Vegetation structure: | Very poor to good |
| Native plant habitat: | Very poor to good |
| Bird habitat: | Very poor to good |
| Aquatic habitat: | Poor |
| Primary (streambed): | Poor |
| Secondary (channel morphology): | Poor |
| Tertiary (bank stabilization): | Fair |
| Vegetative bank stability: | Poor |

**Other conditions:**

- Trail completed in 2010.
- Weedy understory and overstory. Frequent mowing in buffer area has limited habitat quality.
- Upstream of Kalmia, the creek is constructed of concrete and gabions with no natural features. Downstream of Glenwood, the concrete is gone and the vegetation spreads out to make a more natural area.

**Opportunities:**

**Transportation/Recreation:**

- Construct underpasses under 26th St. in conjunction with flood improvements.

**Flood management:**

- Maintain flood conveyance capacity through a combination of sediment removal and selective debris removal and vegetative thinning within the conveyance zone. Non-native species should be selected for removal over native species.

**Habitat protection:** R-44

- Enhance riparian area through Parkside Park.
- Modify creek to have more natural gradient where possible - combine with flood and trail improvements.
- Remove concrete between 26$^{th}$ and Juniper and restore to a more natural condition.

**Water quality:** WQ-52, 53, 54, 72, 73, 80

- Improve habitat at Elmer's Park with vegetative bank stabilization approaches in low flow channel.
- Provide BMP at storm sewer outlet north of Glenwood and at 26$^{th}$ St.

**APPENDIX III**

**REACH INVENTORIES, PROJECTS AND OPPORTUNITIES**

| | |
|---|---|
| **Stream:** | **Fourmile Canyon Creek** |
| **Reach:** | **1** (FCC16) |
| **Location:** | **Diagonal Highway to west side of Pleasantview soccer fields** |

**Habitat conditions:**

| | |
|---|---|
| Vegetation structure: | Good |
| Native plant habitat: | Poor |
| Bird habitat: | Very good |
| Aquatic habitat: | Suboptimal* |

**Other conditions:**

- Trail runs along south side of creek and wetlands.
- Minor drainage issue under 47th St.: Flood water overtops 47th St. frequently.
- Channel is choked with fallen debris from trees.

**Opportunities:**

**Transportation/Recreation:**

- Boulder County's regional trail system identified a grade-separated crossing of the BNSF railroad to connect Four Mile to Cottonwood trail. The project would eliminate a missing link in the regional trail network and supports system connectivity between the City and regional trail networks.

**Flood management:**

- This reach is located in Boulder County and therefore no city initiated flood mitigation is recommended – see the Fourmile Canyon Creek and Wonderland Creek Flood Mitigation Final Plan (2011).

**Habitat protection:** P-32, 33 + weeds

- Preserve and enhance high quality bird habitat.
- Control non-native vegetation (Remove Russian olives and other weedy species).

**Water quality:**

- Protect existing wetland at stormwater outfall at 47$^{th}$ St. for continued water quality treatment capacity.

* Any proposed project in this reach should review the full 2010 aquatic habitat assessment available through the Public Works Water Quality Office

## APPENDIX III

## REACH INVENTORIES, PROJECTS AND OPPORTUNITIES

**Stream:** **Fourmile Canyon Creek**
**Reach:** **2** (FCC16, 15, 14)
**Location:** **West of Pleasantview soccer fields to 28th St.**

**Habitat conditions:**

| | |
|---|---|
| Vegetation structure: | Good |
| Native plant habitat: | Poor to good |
| Bird habitat: | Poor to Very good |
| Aquatic habitat: | Suboptimal* |

**Other conditions:**

- Trail runs along north side of creek.
- Wide trapezoidal channel with concrete cut-off wall drops in Palo Park is highly aggraded and contains heavy sediment deposition.
- Channel is sand bottom and wide with no defined banks in certain areas.
- Sediment dredged from the low flow crossing is stockpiled in the adjacent wetland to the east.
- Some flood capacity may be lost due to sedimentation in channel.
- Good signs of vegetative succession with heavy hydrophytic vegetation. Weeds are dominating on deposited sediment areas.

**Opportunities:**

**Flood management:**

- This reach is located in Boulder County and therefore no city initiated flood mitigation is recommended – see the Fourmile Canyon Creek and Wonderland Creek Flood Mitigation Final Plan (2011).

**Habitat protection:** R-43 + weeds

- Enhance riparian area in Open Space easement where bird habitat quality is very good by planting native vegetation along impacted channel and managing weeds.
- Monitor for weeds and sediment problems downstream of 30th St.
- Improve habitat quality with flood capacity improvements.

**Water quality:** WQ-41, 42

- Restore disturbed areas along the banks and improve stream bank stability using bio-engineered methods.
- Construct BMPs to actively manage sediment downstream of 28th Street.
- Incorporate BMP's at development west of 26th Street to treat storm sewer outfalls and parking lot runoff.

* Any proposed project in this reach should review the full 2010 aquatic habitat assessment available through the Public Works Water Quality Office

## APPENDIX III

## REACH INVENTORIES, PROJECTS AND OPPORTUNITIES

**Stream:** **Fourmile Canyon Creek**
**Reach:** **3** (FCC 12, 11, 09, 07)
**Location:** **28th St. to 19th St.**

**Habitat conditions:**

| | |
|---|---|
| Vegetation structure: | Good to very good |
| Native plant habitat: | Very poor to good |
| Bird habitat: | Poor to good |
| Aquatic habitat: | Marginal* |

**Other conditions:**

- Trail currently being constructed along the north side of creek from 28th to 26th St.
- Lots of bank sloughing and severe bank erosion along areas in Elks property and Githens Acres.
- Lots of trash and debris in creek along entire route.
- Banks stabilized with rock walls, concrete walls, and concrete rubble.

**Opportunities:**

**Transportation/Recreation:**

- Complete trail connections according to the North Boulder Subcommunity Plan. The City of Boulder Complete Streets investment strategy prioritizes this project to provide access between new developments in North Boulder and the Boulder Transit Village and Boulder Junction area.
- Manage access to and use of the riparian areas and creeks within Elks Park.
- Re-evaluate multi-use path from 19th to Garnet Ln. and between Garnet Ln. and 26th. St. (will require amendment of the North Boulder Subcommunity Plan).
- Construct trail underpass at 19th St. and combine a new bridge and culvert at 26th St. with a trail underpass.

**Flood management:**

- Mitigate flood hazard and drainage issues according to the Fourmile Canyon Creek and Wonderland Creek Flood Mitigation Final Plan (2011) including: crossing upgrades at 19th Street, Topaz Drive and 26th Street, channel work between Sumac Avenue and Topaz Drive, replace driveway culvert and relocate driveway near Sumac Avenue and acquire properties near 26th Street.

**Habitat protection:** P&R-28, 29, 30, 31 + weeds;

- Protect high quality vegetation structure and enhance wildlife and native plant habitat quality.
- Explore increasing in-stream flow.
- Enhance under story and ground cover with native plantings.
- Improve and expand quality of riparian buffer and manage weeds, exotics, and dumping through homeowner education.

**Water quality:**

- Remove concrete and other bank structures and revegetate banks where needed.

**Cultural resources:**
**5BL6632** - Farmers Ditch bisects the creek at Elks Park.

**NOTE** - Four aerial crossings of the creek by pipes carrying water from 5BL3813, The Silver Lake Ditch. These are feeders from a lateral of the ditch, and while the Silver Lake Ditch is significant, feeder ditches are not considered significant elements of the ditch. These are between 19th and 26th streets.

**NOTE** - A variety of creek bank treatments are present between 19th and 26th streets, including stacked cobbles, stones in cement, and concrete. These bank treatments are only in a few places, and none appear to be very old.

* Any proposed project in this reach should review the full 2010 aquatic habitat assessment available through the Public Works Water Quality Office

## APPENDIX III

## REACH INVENTORIES, PROJECTS AND OPPORTUNITIES

**Stream:** **Fourmile Canyon Creek**
**Reach:** **4** (FCC 07, 05, 04)
**Location:** **19th St. to west side of Violet Park (13th St.)**

**Habitat conditions:**

| | |
|---|---|
| Vegetation structure: | Very good |
| Native plant habitat: | Poor to good |
| Bird habitat: | Poor to good |
| Aquatic habitat: | Fair |
| Primary (streambed): | Fair |
| Secondary (channel morphology): | Poor |
| Tertiary (bank stabilization): | Good |
| Vegetative bank stability: | Fair to good |

**Other conditions:**

- No trail exists
- The creek is getting considerable use with lots of trash, human waste, and debris along the creek.

**Opportunities:**

**Transportation/Recreation:**

- Off-street trail connections from 19th St. to Broadway.
- Locate trail near Violet and outside of riparian area.
- Construct trail between Violet and 19th St. in the future neighborhood park site.
- Construct trail underpasses at Violet Ave., Upland Ave., and 19th St.

**Flood management:**

- Mitigate flood hazard and drainage issues according to the Fourmile Canyon Creek and Wonderland Creek Flood Mitigation Final Plan (2011) including replacement of crossing at Upland Avenue and Violet Avenue.

**Habitat protection:** P&R-27 + weeds

- Enhance wildlife habitat quality through weed management and native plantings.
- Explore opportunities for enhancing riparian area through park development.
- Remove and revegetate social trails.

**Water quality:** WQ-40

- Stabilize impacted banks through bio-stabilization.
- Explore opportunity for water quality best management practice and flood mitigation in park.

## APPENDIX III

## REACH INVENTORIES, PROJECTS AND OPPORTUNITIES

**Stream:** **Fourmile Canyon Creek**
**Reach:** **5** (FCC 03, 01)
**Location:** **West side of Violet Park to Open Space**

**Habitat conditions:**

| | |
|---|---|
| Vegetation structure: | Poor to good |
| Native plant habitat: | Good to very good |
| Bird habitat: | Good |
| Aquatic habitat: | Poor |
| Primary (streambed): | Fair (to Broadway) |
| Secondary (channel morphology): | Poor |
| Tertiary (bank stabilization): | Fair |
| Vegetative bank stability: | Fair to good |

**Other conditions:**

- Trail runs along south side of creek west of Broadway.
- Channel is very straight with constructed drop/pool structures.
- Sediment and cobble collect in pools.
- Low water crossing problem at the Broadway underpass.

**Opportunities:**

**Transportation/Recreation:**

- Complete trail connection to North Boulder Foothills Park and the Foothills Trail.
- Locate trail outside of riparian area.
- Complete trail from 13th St.

**Flood management:**

- Flood mitigation to be paid for by developers according to the Fourmile Canyon Creek and Wonderland Creek Flood Mitigation Final Plan (2011) including approximately 1,350 feet of channel work west of Broadway and relocation of Rosewood Avenue.

**Habitat protection:** weeds

- Enhance habitat quality through weed management and native plantings. Closely monitor the success of vegetation/plantings.
- Explore opportunities to widen riparian areas through redevelopment.

**Water quality:** WQ-78

- Construct BMPs with new development to manage sediment loads.
- Maintain pools regularly to manage sediment.
- Provide BMPs at major outfalls when feasible.

**Cultural resources:**

**5BL3813** - Silver Lake Ditch crosses the creek via an aerial pipe.

## APPENDIX III

## REACH INVENTORIES, PROJECTS AND OPPORTUNITIES

**Stream:** **Goose Creek**
**Reach:** **1**
**Location:** **North Goose Creek from Pearl Parkway to Foothills Parkway**

**Habitat conditions:**

| | |
|---|---|
| Vegetation structure: | Not rated |
| Native plant habitat: | Not rated |
| Bird habitat: | Not rated |
| Aquatic habitat: | Not rated |

**Other conditions:**

- The creek in this location is a wide, dry, grassed-lined trapezoidal channel. There is very little diversity of vegetation in this reach. The Kline water rights under-drain dewaters most of the creek in this area.

**Opportunities:**

**Flood management:**

- Maintain flood conveyance capacity through a combination of sediment and selective debris removal and vegetative thinning within the conveyance zones. Non-native species should be selected for removal over native species.

**Habitat protection:** R-38, R-39

- Restore North Goose Creek channel as a functional wetland with native plantings, possibly through mitigation banking.
- Develop pilot restoration project below confluence of Wonderland and North Goose Creek. Remove structured channel and restore wetlands using bioengineering approaches.

**Water quality:**

- Investigate opportunity to purchase water rights to establish base flow in North Goose Creek.

**Stream:** **Goose Creek**
**Reach:** **2** (GC 16, 15, 14, 13)
**Location:** **South Goose Creek from Pearl Parkway to Foothills Parkway**

**Habitat conditions:**

| | |
|---|---|
| Vegetation structure: | Very poor |
| Native plant habitat: | Poor to very good |
| Bird habitat: | Very poor to good |
| Aquatic habitat: | Marginal* |

**Other conditions:**

- Previous improvements used rock bank stabilization along narrow trickle channel.
- Outfall with red precipitate at intersection of Boulder and Goose Creek paths.

**Opportunities:**

**Transportation/Recreation:**

- Construct new trail along one side of the channel.
- Construct underpasses at northbound off ramp of Foothills Pkwy, 47th St., 48th St., and 49th St.& Pearl Pkwy.

**Flood management:**

- Maintain flood conveyance capacity through a combination of sediment and selective debris removal and vegetative thinning within the conveyance zone. Non-native species should be selected for removal over native species.

**Habitat protection:** R-41&42; P-40

- Improve wetland habitat conditions.
- Restore wider wetland habitat within trapezoidal channel - possibly through mitigation banking.
- Consider pilot restoration project in conjunction with Pearl Pkwy improvements.

**Water quality:** WQ-55, 56, 75

- Provide BMPs for outfalls from City Yards and along Pearl Parkway.

- Restore aquatic habitat quality by removing rock drops and structural channel and replacing with bioengineered approaches.
- Improve stream bed and channel morphology characteristics.
- Remove barriers to fish movement, especially between outlet of Goose Creek and the pond connecting to Boulder Creek.
- Improve water quality treatment functions of pond at junction of Wonderland and North Goose Creeks.
- Constructed wetland BMP to be incorporated into re-design of City Yards as identified in Stormwater Masterplan

* Any proposed project in this reach should review the full 2010 aquatic habitat assessment available through the Public Works Water Quality Office

| | |
|---|---|
| **Stream:** | **Goose Creek** |
| **Reach:** | **3** (GC 09, 08) |
| **Location:** | **Foothills Parkway to Railroad** |

**Habitat conditions:**

| | |
|---|---|
| Vegetation structure: | Very poor to poor |
| Native plant habitat: | Good to excellent |
| Bird habitat: | Poor |
| Aquatic habitat: | Suboptimal* |

**Other conditions:**

- Trail exists

**Opportunities:**

**Transportation/Recreation:**

- Improve connections to businesses north and south of Goose Creek.

**Flood management:**

- Maintain flood conveyance capacity through a combination of sediment and selective debris removal and vegetative thinning within the conveyance zones. Non-native species should be selected for removal over native species.

**Habitat protection:** P&R-37 + weeds

- Maintain and improve high quality native plant habitat. Improve vegetation structure by planting more native trees and shrubs.
- Manage weeds and monitor vegetation to protect good native plant habitat.
- Inventory for Preble's Meadow Jumping mouse with any future improvements.

**Water quality:** WQ-74

- Provide water quality treatment features at storm water outfalls.
- Replace drop structure with structure which allows fish movement.
- Install proprietary BMP southwest of the intersection of Foothills and Valmont as identified in the Stormwater Masterplan.

**Cultural resources:**

**5BL5820** - Boulder & Left Hand Ditch

**5BL6879** - North Boulder Farmers Ditch - These two ditches are routed over the Goose Creek drainage and through the Foothills Parkway, flowing in from the southwest and curving to the northeast.

* Any proposed project in this reach should review the full 2010 aquatic habitat assessment available through the Public Works Water Quality Office

**APPENDIX III**

**REACH INVENTORIES, PROJECTS AND OPPORTUNITIES**

| | |
|---|---|
| **Stream:** | **Goose Creek** |
| **Reach:** | **4** (GC 08, 07) |
| **Location:** | **Railroad to 28th Street** |

**Habitat conditions:**

Vegetation structure:
Native plant habitat:
Bird habitat:
Aquatic habitat: Suboptimal*

**Other conditions:**

- Trail exists
-

**Opportunities:**

**Transportation/Recreation:**

- Provide connections to businesses east of 30th St.

**Flood management:**

- Maintain flood conveyance capacity through a combination of sediment and selective debris removal and vegetative thinning within the conveyance zone. Non-native species should be selected for removal over native species.

**Habitat protection:** Weeds

- Improve habitat quality from 30th St. to 28th St. by restoring channel and planting native vegetation.
- Manage weeds.

**Water quality:** WQ-63

- Improve water quality function from 30th St. to 28th St with new channel construction.
- Provide water quality treatment feature at 30th St. for outfalls.
- Consistent with Transit Village Area Plan and to the extent possible, improve aquatic and riparian habitat by widening and improving channel and configuring pocket park to provide terrace habitat or water quality improvement features.
- Include water quality management features such as pervious surfaces and bio-filter landscape beds as part of park, depot and bridge.

**Cultural resources:**

**5BL400** - Colorado & Southern Railroad - The railroad crosses Goose Creek, going north-south, at the Reach 3/Reach 4 line. The railroad is elevated above the creek.

* Any proposed project in this reach should review the full 2010 aquatic habitat assessment available through the Public Works Water Quality Office

## APPENDIX III

## REACH INVENTORIES, PROJECTS AND OPPORTUNITIES

| | |
|---|---|
| **Stream:** | **Goose Creek** |
| **Reach:** | **5** (GC 05, 04) |
| **Location:** | **28th Street to Folsom Street** |

**Habitat conditions:**

| | |
|---|---|
| Vegetation structure: | Very good |
| Native plant habitat: | Poor |
| Bird habitat: | Poor |
| Aquatic habitat: | Suboptimal* |

**Other conditions:**

- Trail continues from 28th st to Folsom.

**Opportunities:**

**Flood management:**

- Maintain flood conveyance capacity through a combination of sediment and selective debris removal and vegetative thinning within the conveyance zone. Non-native species should be selected for removal over native species.

**Water quality:** WQ-62

- Provide BMPs upstream of 28th St. in conjunction with Goose Creek Channel Improvements.
- Replace grade control structure in trailer park which blocks fish movement.

**Cultural resources:**

**5BL859** - Boulder & White Rock Ditch - Goose Creek is channeled into the Boulder & White Rock Ditch just west of 28th St.

* Any proposed project in this reach should review the full 2010 aquatic habitat assessment available through the Public Works Water Quality Office

## APPENDIX III

## REACH INVENTORIES, PROJECTS AND OPPORTUNITIES

**Stream:** **Goose Creek**
**Reach:** **6** (GC 03, 01)
**Location:** **Folsom Street to 13th Street**

**Habitat conditions:**

| | |
|---|---|
| Vegetation structure: | Poor to good |
| Native plant habitat: | Poor |
| Bird habitat: | Poor |
| Aquatic habitat: | Marginal* |

**Other conditions:**

- Banks are extremely unstable between 19th St. and Folsom.
- Drop structure at Folsom creates fish barrier.
- Continuous trail connection is not proposed due to potential residential conflicts.

**Opportunities:**

**Transportation/Recreation:**

- Evaluate trail connection between 13th St. and 19th St. in conjunction with potentially day lighting of the creek.

**Flood management:**

- Mitigate flood hazards and drainage issues according to Comprehensive Flood and Stormwater Utility Master Plan (CFS).
- Maintain flood conveyance capacity through a combination of sediment and selective debris removal and vegetative thinning within the conveyance zones. Non-native species should be selected for removal over native species.
- Acquire properties in the high hazard zone according to the city's pre-flood acquisition program.

**Habitat protection:** P&R-36 + weeds; R-53 + weeds

- Enhance quality of the vegetation structure and bird habitat including improving or maintaining aquatic habitat and vegetation in association with channel improvements for upper Goose Creek
- Use homeowner education to enhance vegetation and control weeds.

**Water Quality:** WQ-60, 61; D-4, 5

- Use bioengineering approaches to enhance vegetative bank stability.
- Provide water quality treatment features for outfalls along Edgewood Drive.
- Evaluate potential to daylight creek from 13th to 19th Streets.
- Improve riparian habitat to serve as BMP for storm sewer outfalls along reach.
- Redesign drop structure at Folsom to allow fish passage.

* Any proposed project in this reach should review the full 2010 aquatic habitat assessment available through the Public Works Water Quality Office

## APPENDIX III

## REACH INVENTORIES, PROJECTS AND OPPORTUNITIES

**Stream:** **Gregory Canyon Creek**
**Reach:** **1** (GRC 05, 06, 07, 08, 09, 10)
**Location:** **Boulder Creek to College Avenue**

**Habitat conditions:**

| | |
|---|---|
| Vegetation structure: | Excellent to good |
| Native plant habitat: | Poor |
| Bird habitat: | Poor to very poor |
| Aquatic habitat: | Fair to poor |
| Primary (streambed): | Fair to poor |
| Secondary (channel morphology): | Poor |
| Tertiary (bank stabilization): | Fair |
| Vegetative bank stability: | Fair |

**Other conditions:**

- Creek runs through residential yards
- Creek is narrow and channelized
- Most of reach is deeply entrenched with vertical walls

**Opportunities:**

**Flood Management:**

- Significant split flows occur at University Avenue and Marine Street causing several properties to be added to the floodplain.
- Arapahoe Avenue, Marine Street, 8th Street, University Street, Pleasant Street, Pennsylvania Avenue and College Avenue are all overtopped by 100-year discharge.
- Channel is small, incised and located on private property
- Acquire properties in the High Hazard Zone according to the city's pre-flood acquisition program.
- Outreach to adjacent neighborhoods to raise awareness of flood hazards

**Habitat protection:**

- Low priority for restoration due to location in residential yards
- Homeowner education to improve conditions for native species coupled with an incentive program or technical assistance
- Revegetation / re-channelization downstream of University Avenue

**Water quality:**

- Develop and implement stream habitat improvement matching grant program for adjacent properties
- Educate adjacent neighborhoods to encourage backyard management to protect habitat, wetlands and enhance water quality

## APPENDIX III

## REACH INVENTORIES, PROJECTS AND OPPORTUNITIES

**Stream:** **Gregory Canyon Creek**
**Reach:** **2** (GRC 01, 02, 03)
**Location:** **College Avenue to city limits**

**Habitat conditions:**

| | |
|---|---|
| Vegetation structure: | Very good |
| Native plant habitat: | Good |
| Bird habitat: | Very good to good |
| Aquatic habitat: | Fair to poor |
| Primary (streambed): | Fair to poor |
| Secondary (channel morphology): | Fair to poor |
| Tertiary (bank stabilization): | Excellent to poor |
| Vegetative bank stability: | Excellent to poor |

**Other conditions:**

- Creek runs through residential yards
- Creek is narrow and channelized
- Dyer's Woad occurrence in Smith Park

**Opportunities:**

**Flood management:**

- Flagstaff Road, Willowbrook Road, Aurora Avenue and Euclid Avenue are overtopped by 100-year discharge.
- 100-year floodplain has less split flow and is located in proximity to the channel in this reach.
- There are a few structures in this reach that are highly impacted by the High Hazard Zone. Acquire properties in the High Hazard Zone according to the city's pre-flood acquisition program.
- Outreach to adjacent neighborhoods to raise awareness of flood hazards

**Habitat protection:**

- Landowner and homeowner education about the threat of exotic ornamentals (*Brunnera, Vinca minor, Vinca major)*
- Russian Olive removal
- Eradicate Dyer's Woad occurrence in Smith Park
- Some planting of native cotton woods might restore the balance of species composition

**Water quality:**

- Develop and implement stream habitat improvement matching grant program for adjacent properties
- Educate adjacent neighborhoods to encourage backyard management to protect habitat, wetlands and enhance water quality

## APPENDIX III

## REACH INVENTORIES, PROJECTS AND OPPORTUNITIES

**Stream:** **Kings Gulch**
**Reach:** **1** (KG 01)
**Location:** **Skunk Creek to city limits**

**Habitat conditions:**

Vegetation structure:
Native plant habitat:
Bird habitat:
Aquatic habitat:
- Primary (streambed):
- Secondary (channel morphology):
- Tertiary (bank stabilization):
- Vegetative bank stability:

**Other conditions:**

Channel is undersized upstream of 17th Street and piped downstream of 17th Street.

**Opportunities:**

**Flood Management:**

- Outreach to adjacent neighborhoods to raise awareness of flood hazards
- Floodplain split flow occurs at 17th Street. East of 17th Street flow paths are along Bluebell and King Avenue
- Floodplain mapping update underway that will guide flood mitigation efforts

**Stream:** **Skunk Creek**
**Reach:** **1** (SC 19, 18)
**Location:** **Arapahoe Road to south end of wetlands complex**

**Habitat conditions:**

| | |
|---|---|
| Vegetation structure: | Poor |
| Native plant habitat: | Poor to excellent |
| Bird habitat: | Very good to excellent |
| Aquatic habitat: | Suboptimal* |

**Other conditions:**

- Trail departs from Skunk Creek and connects to the Boulder Creek trail.
- Most of the reach is located on University of Colorado property.
- The creek is very dry in the upper portion of the reach due to water diversion to the ponds.

**Opportunities:**

**Flood management:**

- Mitigate flood hazard and drainage issues according to Comprehensive Flood and Stormwater Utility Master Plan (CFS).
- Maintain flood conveyance capacity through a combination of sediment and selective debris removal and vegetative thinning within the conveyance zone. Non-native species should be selected for removal over native species.
- Acquire properties in the high hazard zone according to the city's pre-flood acquisition program.
- Floodplain mapping is being updated which will guide mitigation efforts

**Habitat protection:** P-25

- Preserve wetlands and buffer area between development and wetlands complex.
- Continue water diversion through wetlands.
- Explore securing base flow from upstream.
- Remove constructed channel and re-vegetate stream banks and riparian area.

**Water Quality:**

- Explore lowering the channel bottom to intercept some groundwater.
- Improve epifaunal substrate and riffle frequency.

* Any proposed project in this reach should review the full 2010 aquatic habitat assessment available through the Public Works Water Quality Office

**APPENDIX III**

**REACH INVENTORIES, PROJECTS AND OPPORTUNITIES**

**Stream:** **Skunk Creek**
**Reach:** **2** (SC 18, 16)
**Location:** **South end of wetlands complex to Wellman Ditch**

**Habitat conditions:**

| | |
|---|---|
| Vegetation structure: | Poor to good |
| Native plant habitat: | Very good to excellent |
| Bird habitat: | Good to very good |
| Aquatic habitat: | Suboptimal* |

**Other conditions:**

- Constructed trail exists.
- Creek has little base flow upstream of the pond outlet.
- North of Wellman, the creek is a wetland mitigation site, and then goes underground in a pipe. Large grouted rock drops are above the pipe - these are eroded and undercut.

**Opportunities:**

**Transportation/Recreation:**

- Construct bridges over Wellman Canal to connect to trail.
- Work with CU to provide public restrooms and water fountains in the CU Research Park.
- The CU Master Plan identifies increased density of East Campus (formerly the CU Research Park). Improve alignment to eliminate existing S-curves north of Discovery Drive.

**Flood management:**

- Mitigate flood hazard and drainage issues according to Comprehensive Flood and Stormwater Utility Master Plan (CFS).
- Maintain flood conveyance capacity through a combination of sediment and selective debris removal and vegetative thinning within the conveyance zone. Non-native species should be selected for removal over native species.
- Acquire properties in the high hazard zone according to the city's pre-flood acquisition program.
- Floodplain mapping is being updated which will guide mitigation efforts

**Habitat protection:** P-34

- Protect and enhance the wetland mitigation site at Colorado Ave.

**Water Quality:**

- Improve riffle frequency in creek channel.
- Remove structured rock in CU Research Park.

**Cultural resources:**

**5BL8819** - Wellman Ditch - The Wellman Ditch flows west to east, but curves to the south where it intersects Skunk Creek, just south of Colorado Ave.

* Any proposed project in this reach should review the full 2010 aquatic habitat assessment available through the Public Works Water Quality Office

**APPENDIX III**

**REACH INVENTORIES, PROJECTS AND OPPORTUNITIES**

**Stream:** **Skunk Creek**
**Reach:** **3** (SC 14, 12, 10, 08)
**Location:** **Wellman Ditch to Baseline Road**

**Habitat conditions:**

| | |
|---|---|
| Vegetation structure: | Good to very good |
| Native plant habitat: | Very poor to good |
| Bird habitat: | Very poor to good |
| Aquatic habitat: | Marginal* |

**Other conditions:**

- Lots of erosion, debris, and rubble in the creek.
- The pond under the building on 29th St. is highly eutrophic.
- Downstream of 29th St., the diversion of water at the Canyon Creek Apts. has taken water from the channel. Mowing along the creek in this area is severe.
- Severely over steep banks in park. Severe erosion from too much access. Trash and debris in creek.
- Day care facility on 30th should be monitored for erosion problems.
- Beer bottles, concrete rubble, and a trench draining antifreeze to the creek.
- Debris and trash dams near Wellman are causing stagnant conditions.
- Flood issues at 30th St.
- Continuous trail connection is not proposed due to potential residential conflicts.

**Opportunities:**

**Transportation/Recreation:**

- Construct a new bike and pedestrian bridge over Wellman Canal in conjunction with flow separation and trail connection to Madison.
- Construct trail connection from E. Aurora to Baseline Rd. with a connection to Arrowwood Park.
- Construct trail underpass under 30th St.
- Open end of the US 36 culvert and provide an additional underpass at the access ramp.
- The CU Master Plan identifies increased density of East Campus (formerly the CU Research Park).Completion of a trail between Baseline Road and E Aurora Avenue would complete a missing link and improve connectivity between East Campus and the Williams Village on-street housing complex as well as the 28th Street Frontage Road area that serves a significant population of off-campus student housing.

**Flood management:**

- Mitigate flood hazard and drainage issues according to Comprehensive Flood and Stormwater Utility Master Plan (CFS).
- Maintain flood conveyance capacity through a combination of sediment removal and selective debris removal and vegetative thinning within the conveyance zones. Non-native species should be selected for removal over native species.
- Acquire properties in the high hazard zone according to the city's pre-flood acquisition program.
- Floodplain mapping is being updated which will guide mitigation efforts

**Habitat protection:** R-54 + weeds

- Restore riparian buffer and improve habitat quality.
- Use homeowner education to manage weeds and control debris in the creek.
- Install aeration devices in pond near 29th and Baseline or restore it as a wetland.
- Work with apartment owners to minimize mowing along creek banks.
- Address flow separation at Wellman Canal.
- Protect constructed wetlands.

**Water Quality:** WQ-43, 44, 45, 46

- Improve reach with poor streambed and channel morphology characteristics (SC08).
- Use bioengineering approaches to improve vegetative bank stability where possible.
- Regrade side slopes and stabilize banks behind Canyon Creek Apts and in park.

- Replace rubble bottoms with wetlands between 30th and Baseline.
- Consider combining two channels behind apartments to concentrate limited base flows.

BMPs for parking lots and outfalls throughout reach - especially at the Canyon Creek Apts. complex and the city park site.

* Any proposed project in this reach should review the full 2010 aquatic habitat assessment available through the Public Works Water Quality Office

| | |
|---|---|
| **Stream:** | **Skunk Creek** |
| **Reach:** | **4** (SC 07, 06) |
| **Location:** | **Baseline Road to west of Broadway** |

**Habitat conditions:**

| | |
|---|---|
| Vegetation structure: | Good to very good |
| Native plant habitat: | Very poor to poor |
| Bird habitat: | Poor |
| Aquatic habitat: | Marginal* |

**Other conditions:**

- Trail exists from Broadway to 27th Way
- Creek is underground below Baseline, then in gabions between car wash and liquor store.
- After the box under Moorhead, the gabions are gone and the channel and riparian area are better developed. However, creek is very confined between the apartment bldgs. and the road.

**Opportunities:**

**Transportation/Recreation:**

- Construct trail between the underpass at 27th Way and the US 36 underpass.
- Construct trail underpass under Moorhead.

**Flood management:**

- Mitigate flood hazard and drainage issues according to Comprehensive Flood and Stormwater Utility Master Plan (CFS).
- Maintain flood conveyance capacity through a combination of sediment and selective debris removal and vegetative thinning within the conveyance zone. Non-native species should be selected for removal over native species.
- Acquire properties in the high hazard zone according to the city's pre-flood acquisition program.
- Floodplain mapping is being updated which will guide mitigation efforts

**Habitat protection:** R-55

- Enhance creek through trash removal, weed control, and native plantings.

**Water Quality:** WQ-76, 77

- Monitor stream changes resulting from new Broadway underpass.
- Improve epifaunal substrate and riffle frequency.
- Widen buffer zone where possible.
- Provide BMP's along proposed trail adjacent to large paved areas.
- Mitigation/restoration project to include renovating gabions and maintaining vegetative bank stability.

* Any proposed project in this reach should review the full 2010 aquatic habitat assessment available through the Public Works Water Quality Office

## APPENDIX III

## REACH INVENTORIES, PROJECTS AND OPPORTUNITIES

**Stream:** **Skunk Creek**
**Reach:** **5** (SC 04, 03, 02, 01)
**Location:** **West of Broadway to city limits**

**Habitat conditions:**

| | |
|---|---|
| Vegetation structure: | Poor to very good |
| Native plant habitat: | Very poor to excellent |
| Bird habitat: | Poor to excellent (near city limits) |
| Aquatic habitat: | Marginal* |

**Other conditions:**

- Trail exists from King Ave to Hollyberry Lane.
- Creek is seasonally dry.
- Upstream of Hollyberry the creek is left wild although there is some trash. Thick poison ivy probably keeps most people out.
- Creek is culverted and fenced under Hollyberry.
- Creek is getting some water from Kohler Reservoir leak. Human impacts in this reach are relatively low, except for the footpath crossings and the concrete dam and bridge/spillway.
- There are many concrete pads and concrete benches.
- In Green Mountain Cemetery, mowing occurs up to creek bank and rock walls have been constructed in some places. Some erosion and head cutting are occurring downstream of the cemetery.

**Opportunities:**

**Flood management:**

- Mitigate flood hazard and drainage issues according to Comprehensive Flood and Stormwater Utility Master Plan (CFS).
- Maintain flood conveyance capacity through a combination of sediment and selective debris removal and vegetative thinning within the conveyance zone. Non-native species should be selected for removal over native species.
- Acquire properties in the high hazard zone according to the city's pre-flood acquisition program.
- Floodplain mapping is being updated which will guide mitigation efforts

**Habitat protection:** P-48

- Protect and enhance high quality habitat.
- Use homeowner education to help control weeds and debris.

**Water Quality:** WQ-68, 69, 70

- Explore possibility of protecting cemetery plots from creek.
- Remove concrete flume and vegetate the residential lot downstream of cemetery.
- Improve epifaunal substrate and riffle frequency.
- Provide BMPs along proposed trail to treat runoff from NOAA parking lots.
- Explore securing a base flow from Kohler Reservoir. (Note that the reservoir contains treated drinking water, therefore chlorine levels may exceed stream standards.)

**Cultural resources:**

**5BL3935** - Anderson Ditch - The Anderson Ditch, flowing north to southeast, intersects Skunk Creek at the northeast corner of the Green Mountain Cemetery.

**5BL5954** - Green Mountain Cemetery - Skunk Creek flows north-northeast through the cemetery. The creek banks through the cemetery are lined with dry-laid stone walls, capped with concrete. The stonework is on both banks in places, and only on the west bank in places.

**5BL8823** - Abandoned Irrigation Feature - A concrete dam and diversion into an 8" pipe is present along Skunk Creek, south of the Green Mountain Cemetery.

**NOTE** - On the southeast side of Skunk Creek are several concrete pads which used to hold circular benches, which are now gone or broken. Apparently a picnic area for NIST, this is a recent manifestation.

**NOTE** - Kohler Reservoir, enclosed, is near Skunk Creek near Hollyberry Lane. Built in 1954, it is yet too young to be considered a cultural resource.

* Any proposed project in this reach should review the full 2010 aquatic habitat assessment available through the Public Works Water Quality Office

## APPENDIX III

## REACH INVENTORIES, PROJECTS AND OPPORTUNITIES

**Stream:** **South Boulder Creek**
**Reach:** **1** (SBC 4.1, 3.1)
**Location:** **Boulder Creek to south end of KOA Lake**

**Habitat conditions:**

| | |
|---|---|
| Vegetation structure: | Good |
| Native plant habitat: | Very good to excellent |
| Bird habitat: | Very good |
| Aquatic habitat: | Suboptimal* |
| Primary (streambed): | Fair |
| Secondary (channel morphology): | Fair |
| Tertiary (bank stabilization): | Poor |
| Vegetative bank stability: | Excellent |

**Other conditions:**

- Trail exists at Valmont Rd and south.

**Opportunities:**

**Flood management:**

- Mitigate flood hazard and drainage issues according to the South Boulder Creek Major Drainageway Plan Alternatives Analysis Report (anticipated to be completed in 2011).
- Maintain flood conveyance capacity through a combination of sediment and selective debris removal and vegetative thinning within the conveyance zone. Non-native species should be selected for removal over native species.
- Acquire properties in the high hazard zone according to the city's pre-flood acquisition program.

**Habitat Protection:** P-49 & 50

- Preserve and enhance riparian, wetland, and aquatic habitat of South Boulder Creek.
- Avoid disturbance to *Spiranthes diluvialis* habitat along Boulder Creek at 61st St.
- Follow management guidelines as specified in the South Boulder Creek Area Management Plan.

**Water quality:** WQ-2, 3, 7, 8

- Treat runoff from adjacent parking lots through BMPs.

* Any proposed project in this reach should review the full 2010 aquatic habitat assessment available through the Public Works Water Quality Office

**APPENDIX III**

**REACH INVENTORIES, PROJECTS AND OPPORTUNITIES**

**Stream:** **South Boulder Creek**
**Reach:** **2** (SBC 19, 2.1, 1.1)
**Location:** **South end of KOA Lake to Arapahoe Road**

**Habitat conditions:**

| | |
|---|---|
| Vegetation structure: | Poor to very good |
| Native plant habitat: | Good |
| Bird habitat: | Good to very good |
| Aquatic habitat: | Suboptimal* |

**Other conditions:**

- Trail exists.
- 4WD access to creek.
- Leggett Ditch head gate takes nearly all the water from the creek.
- Channel is large, trapezoidal and straight.

**Opportunities:**

**Flood management:**

- Mitigate flood hazard and drainage issues according to the South Boulder Creek Major Drainageway Plan Alternatives Analysis Report (anticipated to be completed in 2011).
- Maintain flood conveyance capacity through a combination of sediment and selective debris removal and vegetative thinning within the conveyance zone. Non-native species should be selected for removal over native species.
- Acquire properties in the high hazard zone according to the city's pre-flood acquisition program.
- Manage sediment and debris under the RR crossing.

**Habitat protection:** P&R-1, 2 + weeds

- Maintain high quality bird habitat by preserving and enhancing vegetation structure.
- Enhance and maintain riparian area and buffer area.
- Continue aggressive weed management program to control purple loosestrife.
- Follow management guidelines as specified in the South Boulder Creek Area Management Plan.

**Water Quality:** WQ-1

- Develop BMPs in conjunction with any new development at Arapahoe.
- Close off 4WD roads at the top of the bank.
- Negotiate for more flow downstream of ditch diversion.
- Increase the physical diversity of sections of the channel by creating pools, meanders, etc.

**Cultural resources:**

**5BL400** - Colorado & Southern Railroad - The railroad crosses South Boulder Creek, going east-west, north of Arapahoe Ave.

**5BL799** - Valmont Power Plant, Leggett Inlet - A large diversion from South Boulder Creek known as the Leggett Inlet Canal, aka Hillcrest Feeder Ditch, takes water to the Leggett Reservoir, part of the Valmont Power Plant complex. The diversion is just north of Arapahoe Ave. The head gate at this diversion is shared by the Jones and Donnelly Ditch. The Jones and Donnelly Ditch splits from the Leggett Inlet to the east, out of the study area.

**5BL799** - Valmont Power Plant, Leggett Outlet - A ditch carries water from Leggett Reservoir to South Boulder Creek, where it flows into Boulder Creek, and is then diverted into the Leggett Ditch by White Rocks, east of 75th St. The ditch enters South Boulder Creek where the trail, which runs south along the west edge of the Stazio Ballfields, crosses to the west side of the creek.

**5BL469** - Union Pacific Railroad spur - A spur to the Union Pacific RR which serves the Valmont Power Plant runs north-south along the east side of South Boulder Creek, from north of Arapahoe Ave. to north of Valmont Rd.

* Any proposed project in this reach should review the full 2010 aquatic habitat assessment available through the Public Works Water Quality Office

## APPENDIX III

## REACH INVENTORIES, PROJECTS AND OPPORTUNITIES

**Stream:** **South Boulder Creek**
**Reach:** **3** (SBC 18-09)
**Location:** **Arapahoe Road to Baseline Road**

**Habitat conditions:**

| | |
|---|---|
| Vegetation structure: | Good |
| Native plant habitat: | Very poor to very good |
| Bird habitat: | Poor to very good |
| Aquatic habitat: | Suboptimal* |

**Other conditions:**

- Off-street trail exists for some portion of the reach, and on-road connections for the remainder.
- Continuous trail connection is not proposed due to potential residential conflicts.
- Stream's character changes drastically from upstream conditions.
- Lots of homeowner impacts including dams, dirt piles and horse access.

**Opportunities:**

**Transportation/Recreation:**

- The need for an off street trail will be reevaluated considering the impacts to wetland, riparian and wildlife habitat. Current habitat information supports not putting a trail west of the creek.

**Flood management:**

- Mitigate flood hazard and drainage issues according to the South Boulder Creek Major Drainageway Plan Alternatives Analysis Report (anticipated to be completed in 2011).
- Maintain flood conveyance capacity through a combination of sediment and selective debris removal and vegetative thinning within the conveyance zone. Non-native species should be selected for removal over native species.
- Acquire properties in the high hazard zone according to the city's pre-flood acquisition program.

**Habitat protection:** P-3, 4

- Improve native plant habitat through homeowner education.
- Continue to obtain conservation easements through annexations and other opportunities.
- Acquire properties east and west of the creek to protect riparian habitat.
- Follow management guidelines as specified in the South Boulder Creek Area Management Plan.

**Water Quality:**

- Protect aquatic habitat quality through conservation easements and homeowner education.
- Re-vegetate banks at Dimmit and redesign diversion at Dimmit to allow fish passage.

**Cultural resources:**

**5BL8819** - Wellman Ditch - The Wellman Ditch flows from the west into South Boulder Creek, just south of the south end of Old Tale Road.

* Any proposed project in this reach should review the full 2010 aquatic habitat assessment available through the Public Works Water Quality Office

## APPENDIX III

## REACH INVENTORIES, PROJECTS AND OPPORTUNITIES

| | |
|---|---|
| **Stream:** | **South Boulder Creek** |
| **Reach:** | **4** (SBC 08-00) |
| **Location:** | **South of Baseline Road** |

**Habitat conditions:**

| | |
|---|---|
| Vegetation structure: | Good to very good |
| Native plant habitat: | Very good to excellent |
| Bird habitat: | Very good to excellent |
| Aquatic habitat: | Optimal* |

**Other conditions:**

- Trail exists.

**Opportunities:**

**Flood management:**

- Mitigate flood hazard and drainage issues according to the South Boulder Creek Major Drainageway Plan Alternatives Analysis Report (anticipated to be completed in 2011).

**Habitat protection:** P-5, 6 + weeds

- Follow management guidelines as specified in the South Boulder Creek Area Management Plan.

**Water Quality:**

- Protect and enhance excellent aquatic habitat value.
- Make enclosed ditches fully closed.
- Create better conditions for fish passage when diversion south of Arapahoe is repaired.

* Any proposed project in this reach should review the full 2010 aquatic habitat assessment available through the Public Works Water Quality Office

**APPENDIX III**

**REACH INVENTORIES, PROJECTS AND OPPORTUNITIES**

**Stream:** **Sunshine Creek**
**Reach:** **1** (SNC 01, 02, 03, 04, 05)
**Location:** **Boulder Creek to city limits**

**Habitat conditions:**

| | |
|---|---|
| Vegetation structure: | Very good to good |
| Native plant habitat: | Good to very poor |
| Bird habitat: | Poor |
| Aquatic habitat: | Fair |
| Primary (streambed): | Good to fair |
| Secondary (channel morphology): | Fair |
| Tertiary (bank stabilization): | Fair |
| Vegetative bank stability: | Fair |

**Other conditions:**

- Creek runs through residential lots
- Creek is channelized
- Creek terminates in Eben G. Fine park
- Overall excellent structure, but the vegetative composition is primarily exotics

**Opportunities:**

**Flood management:**

- The floodplain expands from 50' to more than 300' wide
- Several buildings would be flooded north of Spruce Street during the 100-year event
- Shallow flooding on east side of creek
- Shallow flooding extends to 4th Street
- More than 40 buildings affected by flooding
- Outreach to adjacent neighborhood to raise awareness of flood hazards

**Habitat protection:**

- Clear up flow regime hydrograph
- Negotiate with Silver Lake Ditch
- Weed control, especially at downstream end
- Native plantings
- Public education regarding fate of invasive exotics
- Educate homeowners about impacts downstream of exotic plantings
- Silver Lake Ditch carrier clarification

**Water Quality:**

- Educate adjacent neighborhoods to encourage backyard management to protect habitat, wetlands and enhance water quality

## APPENDIX III

## REACH INVENTORIES, PROJECTS AND OPPORTUNITIES

**Stream:** **Two Mile Canyon Creek**
**Reach:** **1** (TMC 01, 02, 03, 04, 05, 06, 07)
**Location:** **15th Street to city limits**

**Habitat conditions:**

| | |
|---|---|
| Vegetation structure: | Excellent to very good |
| Native plant habitat: | Poor to very poor |
| Bird habitat: | Poor |
| Aquatic habitat: | Marginal* |

**Other conditions:**

- Creek runs through residential lots
- Included piped reach
- Good vertical structure
- A picture composition of many creeks in 30-50 years with dominance of elm, ash, and crack willow
- Creek runs north of Foothills Elementary School

**Opportunities:**

**Flood management:**

- The floodplain extends approximately 500' south of the creek
- The floodplain ranges from 200' to 450'
- The floodplain widens and more extensive flooding occurs
- Flood damages steadily increase as the water travels downstream
- Damage to buildings would be extensive as the creek approaches the confluence with Goose Creek
- Outreach to adjacent neighborhoods to raise awareness of flood hazards

**Transportation:**

- Evaluate potential trail improvement from 9th Street to Linden through public process initiated by Transportation staff

**Habitat protection:**

- Day lighting the creek and aggressively planting the channel with riparian and wetland species, but budget constraints may limit feasibility
- Channel eroding significantly throughout reach TMC01, possibly from gabions
- Weed control and native under story planting would improve content and habitat value
- Work with landowners to reduce mowing of the channel, increase control of garden exotics, and encourage planting native species

**Water Quality:**

- Educate adjacent neighborhoods to encourage backyard management to protect habitat, wetlands and enhance water quality

* Any proposed project in this reach should review the full 2010 aquatic habitat assessment available through the Public Works Water Quality Office

**APPENDIX III**

**REACH INVENTORIES, PROJECTS AND OPPORTUNITIES**

| | |
|---|---|
| **Stream:** | **Viele Channel** |
| **Reach:** | **1** (VC 01) |
| **Location:** | **Viele Lake to South Boulder Creek** |

**Habitat conditions:**

Vegetation structure:
Native plant habitat:
Bird habitat:
Aquatic habitat:
- Primary (streambed):
- Secondary (channel morphology):
- Tertiary (bank stabilization):
- Vegetative bank stability:

**Other conditions:**

**Opportunities:**

**Flood Management:**

- Mitigate flood hazard and drainage issues according to the South Boulder Creek Major Drainageway Plan (anticipated to be completed in 2011).

**Transportation:**

- Evaluate potential for trail improvements from Viele Lake to South Boulder Creek through public process initiated by Transportation staff.

| | |
|---|---|
| **Stream:** | **Wonderland Creek** |
| **Reach:** | **1** (WC 16) |
| **Location:** | **North Goose Creek to Valmont Road** |

**Habitat conditions:**

| | |
|---|---|
| Vegetation structure: | Poor |
| Native plant habitat: | Poor |
| Bird habitat: | Poor |
| Aquatic habitat: | Poor |
| - Primary (streambed): | Poor |
| - Secondary (channel morphology): | Poor |
| - Tertiary (bank stabilization): | Fair where channel exists |
| - Vegetative bank stability: | Poor where channel exists |

**Other conditions:**

-

**Opportunities:**

**Transportation/Recreation:**

- Trail project completed missing link.

**Flood management:**

- Maintain existing conditions per the Fourmile Canyon Creek and Wonderland Creek Flood Mitigation Final Plan (2011).

**Habitat protection/Water quality:** R-51; D-3

- Recreate aquatic habitat during channel construction.

**APPENDIX III**

**REACH INVENTORIES, PROJECTS AND OPPORTUNITIES**

| | |
|---|---|
| **Stream:** | **Wonderland Creek** |
| **Reach:** | **2** (WC 16, 15, 14, 13) |
| **Location:** | **Valmont Road to Foothills Parkway** |

**Habitat conditions:**

| | |
|---|---|
| Vegetation structure: | Poor to good |
| Native plant habitat: | Poor to excellent |
| Bird habitat: | Very poor to poor |
| Aquatic habitat: | Poor |
| Primary (streambed): | Poor |
| Secondary (channel morphology): | Poor |
| Tertiary (bank stabilization): | Fair |
| Vegetative bank stability: | Poor to fair |

**Other conditions:**

- Trail exists.

**Opportunities:**

**Flood management:**

- Maintain existing conditions per the Fourmile Canyon Creek and Wonderland Creek Flood Mitigation Final Plan (2011).

**Habitat protection:** P-7 + weeds

- Manage weeds in Noble Park and Christiansen Park.
- Widen riparian area in Christiansen Park and limit mowing.

**Water quality:** R-8

- Preserve existing wetland bottom channel for water quality benefits.
- Improve water quality of pond at Noble Park.

**APPENDIX III**

**REACH INVENTORIES, PROJECTS AND OPPORTUNITIES**

| | |
|---|---|
| **Stream:** | **Wonderland Creek** |
| **Reach:** | **3** (WC 13, 12, 11, 10, 9) |
| **Location:** | **Foothills Parkway to 28th Street** |

**Habitat conditions:**

| | |
|---|---|
| Vegetation structure: | Poor to very good (mostly good) |
| Native plant habitat: | Poor to excellent |
| Bird habitat: | Very poor to poor |
| Aquatic habitat: | Poor to fair |
| Primary (streambed): | Mostly fair, some poor |
| Secondary (channel morphology): | Poor |
| Tertiary (bank stabilization): | Fair |
| Vegetative bank stability: | Mostly fair, some good |

**Other conditions:**

- Creek is piped along 28th Street.

**Opportunities:**

**Transportation/Recreation:**

- Construct new underpasses at the railroad crossing and 28th Street and an at-grade crossing at 34th Street.
- Construct trail from UCAR trail to Iris.

**Flood management:**

- Mitigate flood hazards according to the 2010 Wonderland Creek Foothills to Iris CEAP and the Fourmile Canyon Creek and Wonderland Creek Flood Mitigation Final Plan (2011). Improvements to include: ditch separation and new railroad bridge, increase capacity of Spring Creek Place crossing, new culverts under Iris Avenue, replacement of fire access crossing upstream of the State Highway 119, replacement of pedestrian crossing with clear span bridge just downstream of Kalmia Avenue, increase capacity of Kalmia Avenue crossing, and construct bypass channel on east side of 28th Street.

**Habitat protection:** P&R-9, 10 + weeds; P-11; R-52

- Work with landowners to improve habitat conditions by controlling exotic weed species, removing Russian olives and thistle, and limiting mowing.
- Control reed canary grass infestation downstream of 34th St. and manage for native vegetation.
- Preserve wetland upstream of foothills.
- Widen riparian area by defining mowing edge.
- Control grade of underpass under the Diagonal to minimize drainage of upstream wetlands.
- Widen riparian area upstream of Iris.

**Water quality**: WQ-4, 58, 59, 79; D-2

- Improve water quality through best management practices and bioengineering.
- Provide a BMP near the Boulder Bank.
- Daylight creek along the east side of 28th St. and provide a BMP behind the existing parking lot.
- Remove or soften (bury and re-vegetate) drops and concrete north of Kalmia. Restore to a more natural condition to enhance water quality.
- Explore opportunity for outfall treatment at 28th Street.

**APPENDIX III**

**REACH INVENTORIES, PROJECTS AND OPPORTUNITIES**

| | |
|---|---|
| **Stream:** | **Wonderland Creek** |
| **Reach:** | **4** (WC 09, 08, 07, 06) |
| **Location:** | **28th Street to 26th Street** |

**Habitat conditions:**

| | |
|---|---|
| Vegetation structure: | Very poor to good |
| Native plant habitat: | Poor to good |
| Bird habitat: | Very poor to good |
| Aquatic habitat: | Poor |
| Primary (streambed): | Poor |
| Secondary (channel morphology): | Poor |
| Tertiary (bank stabilization): | Fair |
| Vegetative bank stability: | Poor to fair (concrete wall trickle channel) |

**Other conditions:**

- Trail exists from just south of Winding Trail Dr. to 26th street on south side of creek.

**Opportunities:**

**Transportation/Recreation:**

- Install a box culvert under 28th St. with a trail connection.

**Flood management:**

- Mitigate flood hazards according to the Fourmile Canyon Creek and Wonderland Creek Flood Mitigation Final Plan (2011) including new crossing at 28th Street and Winding Trail Drive and channel work between 26th Street and 28th Street.

**Habitat protection:** R-12

- Improve riparian habitat by planting native trees and shrubs

**Water quality:**

- Remove concrete from channel and replace with targeted structural improvements and bioengineering for bank stabilization.

**Cultural resources:**

**5BL6632 -** Farmers Ditch runs east along Norwood Ave., then north along the west side of 26th St., then crosses 26th and runs northeast. The ditch is in a concrete channel here.

**APPENDIX III**

**REACH INVENTORIES, PROJECTS AND OPPORTUNITIES**

| | |
|---|---|
| **Stream:** | **Wonderland Creek** |
| **Reach:** | **5** (WC 06, 05) |
| **Location:** | **26th Street to west side of Centennial Middle School** |

**Habitat conditions:**

| | |
|---|---|
| Vegetation structure: | Good |
| Native plant habitat: | Good |
| Bird habitat: | Good |
| Aquatic habitat: | Good to very good |
| Primary (streambed): | Fair |
| Secondary (channel morphology): | Poor to fair |
| Tertiary (bank stabilization): | Fair to good |
| Vegetative bank stability: | Fair to good |

**Other conditions:**

- Trail does not exist along Wonderland Creek. Continuous trail connection is not proposed due to potential residential conflicts as identified in the North Boulder Subcommunity Plan.
- No channel through the school property.

**Opportunities:**

**Transportation/Recreation:**

- Construct trail connection along north and east side of school.

**Flood management:**

- Mitigate flood hazards according to the Fourmile Canyon Creek and Wonderland Creek Flood Mitigation Final Plan (2011) including: replacement of 26th Street crossing and construction of an overflow channel on the north side of Centennial Middle School.

**Habitat protection:** P-13 + weeds

- Control exotic species and reduce mowing in buffer area through homeowner education.
- Promote native revegetation of woody species along drainage area.
- Protect and enhance high quality wetlands in Pampas Ct.

**Water quality:** D-1

- Explore day-lighting creek north of Centennial field.

**Cultural resources:**

**5BL6632** - Farmers Ditch runs east along Norwood Ave., then north along the west side of 26th St., then crosses 26th and runs northeast. The ditch is in a concrete channel here.

**APPENDIX III**

**REACH INVENTORIES, PROJECTS AND OPPORTUNITIES**

**Stream:** **Wonderland Creek**
**Reach:** **6** (WC 04, 03, 02)
**Location:** **West side of Centennial Middle School to 15th Street**

**Habitat conditions:**

| | |
|---|---|
| Vegetation structure: | Poor to good |
| Native plant habitat: | Poor to good |
| Bird habitat: | Poor to good |
| Aquatic habitat: | Fair |
| Primary (streambed): | Poor to good |
| Secondary (channel morphology): | Fair to poor |
| Tertiary (bank stabilization): | Fair |
| Vegetative bank stability: | Fair to good |

**Other conditions:**

- No trail exists. Continuous trail connection is not proposed due to potential residential conflicts as identified in the North Boulder Subcommunity Plan.
- Unconfined channel.
- Subdivisions and new house construction are having an impact on the condition of the habitat.
- Fencing, water diversions, and mowing are also causing an impact.

**Opportunities:**

**Transportation/Recreation:**

- Construct trail between Garnet and 19th St.
- Re-evaluate off-street trail opportunities considering North Boulder Subcommunity Plan.

**Flood management:**

- Mitigate flood hazards according to the Fourmile Canyon Creek and Wonderland Creek Flood Mitigation Final Plan (2011) including: replacement of 19th Street crossing and channel work between 19th Street and west side of Centennial Middle School.

**Habitat protection: P&R-15 + weeds**

- Improve native plant habitat quality and vegetative structure.
- Control weeds and exotics (especially reed canary grass and knapweed), and dumping of yard waste through homeowner education.

**Water quality:** WQ-6

- Explore opportunities for BMPs at 19th St. outfalls.
- Improve stream bed characteristics at upstream end of this reach by providing appropriate substrate and riffles.
- Preserve and enhance meandering low-flow channel.
- Use vegetation to maintain bank stability in down-cut section.
- Remove cross basin transfer in pipe to Fourmile Creek at 19th St.
- Evaluate potential for re-colonization downstream of 19th St.

**Cultural resources:**

**NOTE** - A house foundation is present just east of 19th St. at Redwood Ave. This appears to be post World War II, thus too young to be a cultural resource.

**APPENDIX III**

**REACH INVENTORIES, PROJECTS AND OPPORTUNITIES**

| | |
|---|---|
| **Stream:** | **Wonderland Creek** |
| **Reach:** | **7** (WC 01) |
| **Location:** | **15th Street to Broadway** |

**Habitat conditions:**

| | |
|---|---|
| Vegetation structure: | Good |
| Native plant habitat: | Poor |
| Bird habitat: | Poor |
| Aquatic habitat: | Good |
| Primary (streambed): | Good |
| Secondary (channel morphology): | Good |
| Tertiary (bank stabilization): | Good |
| Vegetative bank stability: | Good |

**Other conditions:**

- No trail exists. Continuous trail connection is not proposed due to potential residential conflicts as identified in the North Boulder Subcommunity Plan.
- City drainage easement along the channel. Channel is concrete wall with a trickle channel. Easement is maintained by the homeowner's association.

**Opportunities:**

**Flood management:**

- Maintain existing conditions per the Fourmile Canyon Creek and Wonderland Creek Flood Mitigation Final Plan (2011).

**Habitat protection:**

- Improve native plant habitat and vegetative structure.
- Work with homeowners to widen and enhance riparian area through revegetation of native plants and limiting mowing in buffer area.

**Water quality:** WQ-5

- Provide BMPs near 15th St.

| | |
|---|---|
| **Stream:** | **Wonderland Creek** |
| **Reach:** | **8** (WC 01) |
| **Location:** | **West of Broadway** |

**Habitat conditions:**

| | |
|---|---|
| Vegetation structure: | Good |
| Native plant habitat: | Poor |
| Bird habitat: | Poor |
| Aquatic habitat: | Good |
| Primary (streambed): | Good |
| Secondary (channel morphology): | Good |
| Tertiary (bank stabilization): | Good |
| Vegetative bank stability: | Good |

**Other conditions:**

- Trail connects from Broadway to Broadway underpass.
- Managed as open space by the Open Space and Mountain Parks Department.

**Opportunities:**

**Flood Management:**

- Maintain existing conditions per the Fourmile Canyon Creek and Wonderland Creek Flood Mitigation Final Plan (2011).

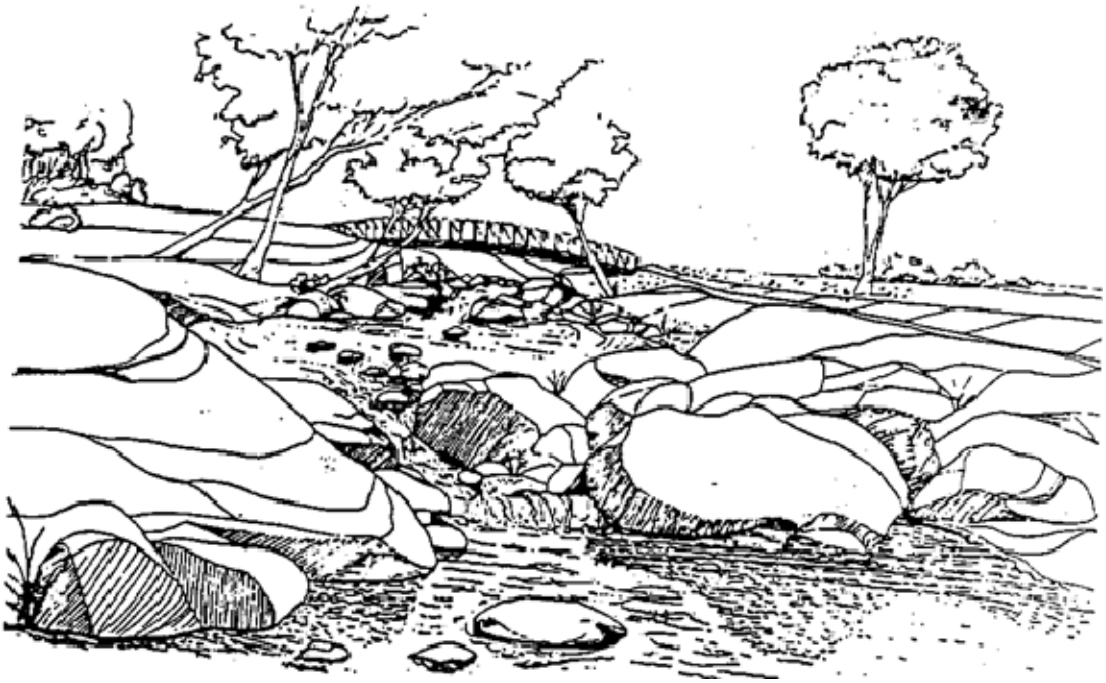
**Habitat protection:** P-14

- Follow management guidelines as specified in the Open Space Area Management Plan.

**Cultural resources:**

**5BL3814** - Wonderland Lake, on Open Space
**5BL3815** - Degge Fish Rearing Complex, on Open Space.

# TRIBUTARY GREENWAY GUIDELINES FOR OPEN SPACE AND PARK LANDS



**Approvals**

April 20, 1993
James C. Crain, Director, City of Boulder Open Space/Real Estate Department
Chris Dropinski, Director City of Boulder Parks and Recreation Department
David Rhodes, Director, City of Boulder Public Works Department

Summer, 1993
Stephen T. Honey, City Manager, City of Boulder

February 9, 1994
Open Space Board of Trustees

March 29, 1994
Parks and Recreation Advisory Board

# TRIBUTARY GREENWAYS GUIDELINES FOR OPEN SPACE AND PARK LAND

The City of Boulder has several missions, chief among them are providing services to the public and maintaining a healthy environment. Boulder is held out as a model community because of its commitment to preservation of the natural environment and quality of life. Few accomplishments illustrate this commitment better than the Open Space and Mountain Parks systems and the Boulder Creek path.

The goals of these programs are fundamentally those of the City; however each implementing department, in order to provide services to the public must focus its resources on a set of specific goals and objectives. For the City to function optimally these departmental goals and objectives must be mutually agreed to and carefully coordinated.

The Tributary Greenways Program is charged, in part, with providing recreation and transportation facilities as well as water quality, flood control and environmental enhancement in an environmentally responsible manner. The Open Space/Real Estate Department and the Parks and Recreation Department are mandated by policy, ordinance and the City Charter to, among other things, preserve the environment and natural features present on Open Space and Mountain Park lands and to provide passive recreation opportunities where appropriate. City Council through endorsement of the Boulder Valley Comprehensive Plan and goals of the Wetland Protection Program has expressed a strong interest in protecting other sensitive natural areas on City-owned lands and elsewhere in the City.

These guidelines have been drafted to provide staff level guidance for the planning, design and construction of Tributary Greenway projects with the overall goal of fostering interdepartmental teamwork and insuring that these projects are integrated with City goals and objectives as well as the City charter requirements.

- Establish a staff-level perspective which integrates the goals and objectives of the Tributary Greenways, Parks and Recreation and the Open Space programs.

- Provide a mechanism to complement the existing public process by which staff members can recognize and weigh the community and environmental impacts and benefits as well as fiscal costs of each project.

- Provide a routine method of addressing planning, construction and management issues of proposed Tributary Greenways improvements on open space, and park lands in a way that is

beneficial to the public and which addresses the goals of the City Charter.

- Develop a time line and process for project review, public hearing and final approval for Tributary Greenway projects prior to construction on open space and park lands.

Executive Summary

**Part I** of the guidelines proposes broader staff involvement at the conceptual design phase of the Tributary Greenways Program. This step is proposed to increase the availability of expertise present among the City staff in order to achieve Tributary Greenway and departmental program goals of environmental and habitat preservation, restoration, flood control, recreation, transportation and other goals.

**Parts II and III** provide specific guidance to streamline the process, while providing adequate involvement of the public and staff.

## Scope

These guidelines are applicable to components of the Tributary Greenways program and those projects shown on the Tributary Greenways masterplan proposed to be constructed with City funds or as part of a City project. The focus is upon Tributary Greenways projects proposed to be constructed on open space and park land and could be used as a model for other trail or related projects. These guidelines are not intended to preclude the requirements of other City, State or Federal requirements. Whenever portions of these guidelines can be accomplished through other City processes, the interested parties from the affected departments shall work together to avoid adding unnecessary process.

## Part I-Conceptual Design

A long range approach will foster an understanding of common goals and objectives, and will result in a better product born of staffs collective vision, expertise, and teamwork. An interdisciplinary staff team drawn from involved City departments should propose and review conceptual designs for consistency with adopted City goals and objectives. Such long-range planning should consider cumulative impacts and benefits of the Tributary Greenway system. These plans should be presented in the context of the system-wide plan, and its potential benefits and impacts.

Tributary Greenways staff can expect "up front" assistance with gathering information about such issues as wetlands, water quality, wildlife and rare plant habitat in order to preserve these sensitive features and develop the least

damaging alternative design. A no build alternative will be proposed in cases where projects cannot be designed without significant adverse environmental impact. This approach will increase efficiency and comprehensiveness of the project review and will provide opportunities for broad staff participation in constructing a quality Tributary Greenway system.

Broad involvement by City staff will not only foster teamwork, but will also provide assistance to the Tributary Greenway staff in meeting the stated program goals and objectives. Among other goals, the Tributary Greenway master plan calls for:

- Conducting environmental and cultural assessments along stream corridors singly and cumulatively to determine the overall biological effects of greenway construction.
- Determining appropriate buffer widths between greenways and natural areas.
- Consideration of restoration and improvement of wildlife habitat.
- The preparation of restoration plans to mitigate disturbances caused by past management practices.
- The implementation of a re-vegetation and planting program for each stream corridor preserving existing native vegetation to extent possible.
- Preserving and creating wetlands for water quality, wildlife habitat and passive recreation.
- Maintaining or improving the flood carrying capacity of the Tributary creeks.
- Acquiring land for achieving these goals.

Responsibility for these issues is a City-wide concern. Meeting these goals requires teamwork and a great deal of preplanning and investigation. The interdisciplinary staff team by working together can integrate City and Departmental goals, including applicable Charter requirements, thereby saving money and time. The end result will be a model system that is planned and constructed with the greatest possible ecological sensitivity.

## Part II Planning of Trail/Greenway Segments

The planning process for construction of greenway segments will include a designated team of city staff members. As a starting point the team may consist of members from Public Works, Open Space and Parks and Recreation depending on the nature and location of the project. This structure will facilitate development of a draft plan supported by all departments involved. As part of the planning process the departmental representative will assist the Tributary Greenway coordinator by:

- Acting as a central contact person with the "host"[2] department.

[1]in cases where land managed by more than one department is involved in a project, each department will host the portion of the project occurring on the land which they manage.

- Identifying potential user or use conflicts (agriculture, other trail uses, public safety, etc) and develop solutions to these conflicts through consultation and review with staff.
- Coordination with Tributary Greenway staff and providing appropriate assistance to obtain the appropriate advisory board recommendations, permits and authorizations
- Assisting with documentation on the significance and location of any sensitive environmental or cultural areas and finding ways to preserve, avoid or mitigate.
- Identifying maintenance and safety concerns and other fiscal impacts to and from the host department.
- Determining maintenance responsibilities.
- Providing standards for reclamation/mitigation.

Once the staff team has analyzed the appropriate options and evaluated the project in light of all City goals and objectives, it will draft a project design recommendation to be reviewed by any interested department. For projects where a Community Environmental Assessment (CEAP) is called for, the Development Review process will serve this purpose. In cases where no CEAP is required, the host department will, as a minimum, review the project at staff level. Board and Council review and approval of proposed projects will be sought as appropriate and necessary.

<u>Proposed Process for Review by Host Department (when no CEAP is required)</u>

1. **Provide timely notice to the department and provide project design (description and drawings).**
   (This can be done through the department's representative on the planning team.)

2. **Within one week conduct a field trip.**

3. **Coordinate with departmental representative for presentation to Trails Committee.**

4. **Allow up to three weeks for comments on project design, and provide for an analysis of any real estate acquisition that should be necessary.**

5. **Modify project design according to departmental program recommendations and or Federal, state or local requirements.**

6. **Department review of revised design within one week.**

7. **If required, and/or appropriate coordinate with departmental representative for presentation to advisory board. Presentation will normally be within one month of final project design.**

## Part III Construction

Even with the greatest foresight and planning, the actual construction of a project presents opportunities for poor communication and potential for adverse environmental impact. To avoid such conflicts, coordination and communication should continue throughout the construction of the project.

A copy of the final design plans will be provided to the host department for review prior to construction. The host department should be given at least a week to review the plans and provide comments. After staff review, an on-site pre-construction meeting will be held. This meeting should include the Tributary Greenway Coordinator, the departmental representative, project manager if any, project inspector and the contractors. Topics that should be addressed include:

- Establishing the authority of host department personnel to direct the contractors in emergencies.
- Establishing guidelines for the storage of materials and equipment.
- Determining the working days and hours of the contractors where conflicts with visitor use are anticipated (e.g. weekends).
- A schedule for field checking temporary fencing, flagging and protective measures to occur prior to the onset of construction.
- Establishing site conditions for the purpose of establishing standards for reclamation.
- Establishing a specific contact for the Tributary Greenway program on site, and who should be contacted if problems arise.
- Discuss acquisition needs and time line for negotiation and purchase within a time frame that allows for the acquisition of property prior to construction.
- Determining maintenance responsibilities.

In order for construction to proceed, written approval must be issued by the department head or designee. Such approval should be provided within 5 working days after the pre-construction meeting providing that all the other conditions and requirements of these guidelines have been met.

The host department must be notified of any substantive changes to the plans, either prior to construction or during construction itself, they then must be available by telephone or radio to respond to the construction site if necessary.

A post-construction meeting of the host department, and the contractor should be scheduled by the Tributary Greenway coordinator to establish the site conditions for the purposes of reclamation and to insure that final site clean-up meets with the approval of the host department.

**APPENDIX V**
**Explanation of transportation amendments to Table II-3 Ranking of Greenway Objectives by Reach**

**FC1** – **High** – Boulder County's regional trail system identified a grade-separated crossing of the BNSF railroad to connect Four Mile to Cottonwood trail. The project would eliminate a missing link in the regional trail network and supports system connectivity between the City and regional trail networks.

**FC3-5 – High** – Provides trail connectivity between high density residential area and regional transit center. The City of Boulder Complete Streets investment strategy prioritizes this project to provide access between new developments in North Boulder and the Boulder Transit Village and Boulder Junction area.

**WC1 – N/A –** A trail project completed this missing link since the 2001 Greenway Master Plan.

**WC3 – High** – Provides trail connectivity between high density residential land uses and regional transit center. The City of Boulder Complete Streets investment strategy prioritizes this project to provide access between multi-family residential/commercial developments and the Boulder Transit Village and Boulder Junction area.

**WC4 – N/A –** The Wonderland Creek to Four Mile Creek connector trail completed this missing link.

**WC5 – Medium** – There is a lack of east-west on-street bikeway options. Additionally, Wonderland creek is in close proximity to Crestview elementary school and would provide trail connectivity to Folsom Street on-street bike lanes.

**WC6 – Low** – Trail construction would require significant property acquisition / easements. Wonderland creek runs parallel and adjacent to low volume residential street that is designated as a bike route.

**WC7 – Not Sure** – Check with Annie

**GC1 – N/A –** Two transportation improvement projects completed this missing trail link and constructed a grade-separated crossing of Foothills. The remaining proposed grade-separated crossings of commercial driveways are not anticipated to provide a significant transportation improvement as vehicle volume and auto verses trail user conflicts would be low.

**GC2 – N/A –** The proposed grade-separated trail crossings along this Greenway reach were removed from the Transportation Master Plan as part of the 2003 update. These improvements are not anticipated to provide a significant transportation improvement. The existing and anticipated future vehicle volume of the commercial driveways and auto verses trail user conflicts would be low.

**GC5 – N/A –** A utilities improvement project completed this trail missing link.

**ETC1 – N/A –** A utilities/transportation improvement project completed this trail missing link.

**BC2 – High** – The Transportation Master Plan identifies a project to complete a trail connection between Boulder Creek and 48th Street. This trail connection will provide direct access to Boulder Community Hospital – Foothills campus, Ball Aerospace and several other commercial office complexes on the south side of the Creek. The hospital and Ball Aerospace each committed $50K in escrow funds to help fund the project cost.

**BC5 – Medium** – The existing trail between 28th Street and Scott Carpenter park is narrow and winding with limited sight distance. Consider widening and straightening the alignment as opportunities arise.

**SC2 – Low** – The CU Master Plan identifies increased density of East Campus (formerly the CU Research Park). Improve alignment to eliminate existing S-curves north of Discovery Drive.

**SC3 – Medium** - The CU Master Plan identifies increased density of East Campus (formerly the CU Research Park).Completion of a trail between Baseline Road and E Aurora Avenue would complete a missing link and improve connectivity between East Campus and the Williams Village on-street housing complex as well as the 28th Street Frontage Road area that serves a significant population of off-campus student housing.

**SC4 – Low** – Completion of the last segment of trail between the underpass at 27th Way and underpass at US36 would provide system connectivity. This is private property anticipated to redevelop in the near future.

**BCC5 – N/A** – This trail segment was removed from the Transportation Master Plan as part of the 2003 update. The creek corridor is adjacent to on-street bikeway facilities along Table Mesa Drive.

**TMC1 – Low** – The proposed trail segment is identified in the vision plan funding scenario of the TMP. Construction of the trail would require property acquisition from two residential property owners and would be pursued opportunistically as the easement agreements if and when the city secures s the right of way through acquisition or easements.

**DC1 – Low** - The proposed trail segment is identified in the vision plan funding scenario of the TMP. Trail construction would require significant property acquisition / easements. Bicycle lanes along 55th Street and the South Boulder Creek greenway trail run parallel and adjacent to this proposed north-south.

**DC2 – Low** - The proposed trail segment is identified in the vision plan funding scenario of the TMP. Trail construction would require significant property acquisition / easements. Bicycle lanes along 55th Street and the South Boulder Creek greenway trail run parallel and adjacent to this proposed north-south.

# APPENDIX VI
## Rankings of Habitat Reaches on Public Properties for Possible Habitat Restoration Projects – Biohabitats 2007

**Table 2 -- Rankings of Habitat Reaches on Public Properties for Possible Habitat Restoration Projects**

Low total score represents reaches with opportunities to improve habitat condition in good landscape settings.

| Property (Grnwy Reach) | Habitat Reach -- Gershman ID | Bank Stability BS (avg) | Bank Stability 10 scale | Rip. Veg. Zone Width RW (avg) | RW 10 scale | Native Plant | NP 10 scale | Vegetation Structure VS | VS 10 scale | PIFs adj. to 8 scale | Prebles Hab. Y=1 pt | Spranthes Y=1 pt | Wetland Habitat | Wetland Hab. 10 scale | Habitat Condition - possible 60 pts | Within 100M High Qual. Aq. Hab. | Within 100M Mtn Habitat | Wihin 100M Plains Habitat | Landscape sub-total (Low best) | SUBTOTAL | **Imp. Opportunity- Good | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bear Crk hospital* | BRC32A* | | 3.0 | | 3.0 | | 3 | | 3 | 3 | | | | 3.0 | 18.0 | 1 | 25 | 25 | 51 | 69 | 1 | 70.0 |
| East Palo Park (FC2)/Pleasan | FCC-16 | 9 | 9.9 | 2.5 | 2.8 | 8 | 4 | 9.5 | 7 | 7 | | | 18 | 7.7 | 39.1 | 5 | 25 | 1 | 31 | 70 | 5 | 75.1 |
| Anna Dunn (WC8) | WC-01 | 9 | 9.9 | 7.5 | 8.3 | 8 | 4 | 9.5 | 7 | 5 | 1 | 1 | 16 | 6.9 | 43.4 | 5 | 1 | 25 | 31 | 74 | 1 | 75.4 |
| Eben Fine Park (BC7) | BC-03 | 7.5 | 8.25 | 2 | 2.2 | 16 | 8 | 12 | 9 | 8 | | | 14 | 6.0 | 41.5 | 0 | 1 | 25 | 26 | 68 | 15 | 82.5 |
| East Park #2 (BC3)&Sandy Ar | BC-45 | 7 | 7.7 | 1 | 1.1 | 4 | 2 | 10 | 8 | 4 | | | 14 | 6.0 | 28.7 | 0 | 25 | 25 | 50 | 79 | 5 | 83.7 |
| Flatirons Golf Course (?) | DC-07 | 4 | 4.4 | 1 | 1.1 | 12 | 6 | 8 | 6 | 5 | | | 15 | 6.5 | 28.8 | 5 | 25 | 25 | 55 | 84 | | 83.8 |
| between 47th and King's Ridg | WC-13 | 7 | 7.7 | 2 | 2.2 | 20 | 10 | 7 | 5 | 4 | | | 0 | 0.0 | 29.4 | 5 | 25 | 25 | 55 | 84 | | 84.4 |
| Arrowwood Park (SC3) | SC-12 | 3 | 3.3 | 4 | 4.4 | 8 | 4 | 11.5 | 9 | 4 | | | 15 | 6.5 | 31.2 | 5 | 25 | 25 | 55 | 86 | | 86.2 |
| Scott Carpenter Park (BC5) | BC-34 | 7 | 7.7 | 1.5 | 1.7 | 7 | 4 | 8.5 | 7 | 7 | | | 14 | 6.0 | 32.0 | 0 | 25 | 25 | 50 | 82 | 5 | 87.0 |
| Arrowwood Park (SC3) | SC-10 | 7 | 7.7 | 1 | 1.1 | 11 | 5 | 10.5 | 8 | 3 | | | 17 | 7.3 | 32.5 | 5 | 25 | 25 | 55 | 87 | | 87.5 |
| Flatirons Golf Course (SBC3) | SBC-18 | 9 | 9.9 | 4.5 | 5.0 | 8 | 4 | 10 | 8 | 5 | | | 16 | 6.9 | 38.5 | 0 | 25 | 25 | 50 | 89 | | 88.5 |
| William Arnold (BC2) | BC-47 | 9 | 9.9 | 3 | 3.3 | 9 | 5 | 11 | 8 | 6 | | 1 | 14 | 6.0 | 39.1 | 0 | 25 | 25 | 50 | 89 | | 89.1 |
| Z-Folsom (BC5)/ Folsom St (e | BC-30 | 7 | 7.7 | 1 | 1.1 | 5 | 3 | 10 | 8 | 5 | | | 14 | 6.0 | 29.6 | 5 | 25 | 25 | 55 | 85 | 5 | 89.6 |
| William Arnold (BC2) | BC-48 | 9 | 9.9 | 1 | 1.1 | 9 | 5 | 11 | 8 | 5 | | 1 | 14 | 6.0 | 36.2 | 0 | 25 | 25 | 50 | 86 | 5 | 91.2 |
| N.I.S.T. (SC5) | SC-03 | 9 | 9.9 | 9 | 9.9 | 5 | 3 | 12.5 | 10 | 6 | | | 17 | 7.3 | 45.5 | 5 | 1 | 25 | 31 | 77 | 15 | 91.5 |
| Parkside Park (ETC1) | ETC-01 | 7 | 7.7 | 1 | 1.1 | 9 | 5 | 8.5 | 7 | 5 | | | 15 | 6.5 | 31.7 | 5 | 25 | 25 | 55 | 87 | 5 | 91.7 |
| Swoboda Memorial - west of 1 | BC-19 | 7 | 7.7 | 1.5 | 1.7 | 11 | 6 | 8.5 | 7 | 4 | | | 14 | 6.0 | 30.9 | 0 | 25 | 25 | 50 | 81 | 15 | 95.9 |
| between Eben J Fine and 6th | BC-09 | 6 | 6.6 | 2 | 2.2 | 9 | 5 | 12.5 | 10 | 5 | | | 14 | 6.0 | 33.5 | 0 | 25 | 25 | 50 | 84 | 15 | 98.5 |
| Municipal Complex & Library ( | BC-15 | 4 | 4.4 | 0.5 | 0.6 | 13 | 7 | 9 | 7 | 4 | | | 14 | 6.0 | 28.9 | 5 | 25 | 25 | 55 | 84 | 15 | 98.9 |
| Municipal Complex & Library ( | BC-17 | 6 | 6.6 | 1 | 1.1 | 8 | 4 | 9 | 7 | 4 | | | 14 | 6.0 | 29.0 | 5 | 25 | 25 | 55 | 84 | 15 | 99.0 |
| Watts Hardy/ Mary Wolff Park | BC-22 | 8 | 8.8 | 1 | 1.1 | 7 | 4 | 12.5 | 10 | 5 | | | 14 | 6.0 | 34.0 | 0 | 25 | 25 | 50 | 84 | 15 | 99.0 |
| Bike Path at 28th (east of 28th | BC-32 | 8.5 | 9.35 | 1 | 1.1 | 7 | 4 | 10 | 8 | 2 | | | 14 | 6.0 | 29.3 | 5 | 25 | 25 | 55 | 84 | 15 | 99.3 |
| Kids Fishing Pond (BC7)Sculp | BC-12 | 6.5 | 7.15 | 2 | 2.2 | 8 | 4 | 12 | 9 | 6 | | | 14 | 6.0 | 34.3 | 0 | 25 | 25 | 50 | 84 | 15 | 99.3 |
| Mesa Memorial Park - north of | BRC-07 | 7 | 7.7 | 2 | 2.2 | 8 | 4 | 7.5 | 6 | 5 | | | 14 | 6.0 | 30.2 | 5 | 25 | 25 | 55 | 85 | 15 | 100.2 |
| Pearl Street Industrial Park (B | BC-49 | 8 | 8.8 | 2 | 2.2 | 9 | 5 | 11 | 8 | 4 | | 1 | 14 | 6.0 | 35.3 | 0 | 25 | 25 | 50 | 85 | 15 | 100.3 |
| Eben Fine Park (BC7) | BC-04 | 8 | 8.8 | 1.5 | 1.7 | 15 | 8 | 12 | 9 | 5 | | | 14 | 6.0 | 38.3 | 0 | 25 | 25 | 50 | 88 | 15 | 103.3 |
| between Eben J Fine and 6th | BC-06 | 7 | 7.7 | 3.5 | 3.9 | 12 | 6 | 13 | 10 | 5 | | | 14 | 6.0 | 38.8 | 0 | 25 | 25 | 50 | 89 | 15 | 103.8 |
| between Eben J Fine and 6th | BC-06 | 7 | 7.7 | 3.5 | 6.4 | 12 | 6 | 13 | 10 | 5 | | | 14 | 6.0 | 41.3 | 0 | 25 | 25 | 50 | 91 | 15 | 106.3 |

Notes

* Since habitat assessment values were not available for this reach but it had been identified by OSMP as a possible restoration site, we estimated scores using a flat rate score for each criteria based in part on our observations of the property.

** Opportunity based on site observations of potential and obstacles. Top 5 and select other sites visited per agreement.